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United States Department of Agriculture

U.S. DEPARTMENT OF AGRICULTURE,
FOREST SERVICE
Washington, D.C., July 1, 1970

HON. CLIFFORD M. HARDIN
Secretary of Agriculture

DEAR MR. SECRETARY:

This annual report summarizes the numerous activities and major accomplishments of the Forest Service for 1969.

Forests—the Nation's precious heritage—comprise one-third of the country's total area. Through the years, these public and private forestlands have furnished raw materials to build our homes and cities and supply our basic wood-using industries. These lands have also yielded other multiple use values—outdoor recreation, including hunting and fishing; beautiful landscapes; forage for livestock and wildlife, clean water and pure air. This report shows that the Nation's rapid population growth and accelerated technological advances are placing greater demands upon America's forests that furnish these goods and services.

Through administration of the National Forest System, forestry research, and cooperation with State and private owners of forest lands, the Forest Service is committed to protect this timberland resource and promote the wise use of its material and esthetic values. The periodic harvest of these values at a sustained level is needed to maintain the social vigor and economic health of both urban and rural areas.

With the Department's continued leadership and support, we can improve our services to the American people. We can also do our share toward bettering the quality of human life and enhancing our natural environment.

Edward P. Cliff

EDWARD P. CLIFF
Chief, Forest Service.

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This report covers calendar year activities unless otherwise identified. Records on a fiscal year basis are so reported. Mention of commercial companies, products, or services is solely for necessary historical identification and implies no endorsement by the Department.

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The Forest Service, U.S. Department of Agriculture, is dedicated to the principle of multiple-use management of the Nation's forest resources for sustained yields of wood, water, forage, wildlife, and recreation. Through forestry research, cooperation with the States and private forest owners, and management of the National Forests and Grasslands, it strives—as directed by Congress—to provide increasingly greater service to a growing Nation.

FRAMEWORK for the FUTURE

THE FOREST SERVICE has approved and distributed to its field offices a new statement of basic objectives and policies which set forth the responsibilities of the Service—in management of the National Forest System, in State and Private Forestry, and in Research related to forests.

Our success in reaching these objectives will be measured by our performance and by our flexibility in meeting those needs. Throughout we will seek to conduct our activities in such a way as to assure prompt, courteous, and competent service to the public.

The basic considerations, objectives, and policy guides follow.

BASIC CONSIDERATIONS

The Forest Service has the federal responsibility for national leadership in forestry—

National leadership includes top-level participation in setting national priorities, formulating programs, and establishing the pattern of Federal policies that relate to man and his natural environment. Effective leadership in forestry is an all-inclusive objective of the Forest Service.

Forest Service responsibilities and interests go beyond forested lands—

Forests and forest-related rangeland, grassland, brushland, alpine areas, minerals, water areas, and wildlife habitat illustrate the variety of natural resources involved in the scope of forestry. Forestry also involves the less tangible values such as scenery, air and water quality, recreation, open space, environmental quality, economic strength, and social well-being. In the following objectives and policy statements the terms "forests" and "forestry" are used in this broad sense.

In our complex society there must be an inter-relationship among objectives, policies, and goals—

Listed here are those objectives and illustrative policies, national in scope, which pertain to the Forest Service as an agency of the U.S. Department of Agriculture and as an element within the Federal structure. There is a hierarchy of objectives, policies, and goals at each major level of the Forest Service organizational structure. The interrelationships among various objectives and policies must be an integral part of decision-making at all organizational levels, ranging from the most all-encompassing, long-range planning, to identification of specific targets of immediate concern.

OBJECTIVES and POLICY GUIDES

The following objectives are not listed by priority. The policy statements do not constitute a complete policy list but, rather, are intended to illustrate some of the implications of the objectives and provide at least a partial framework for the more specific policy development that is a continuing necessity at all levels within the Forest Service.

Promote and achieve a pattern of natural resource uses that will best meet the needs of people now and in the future.

- Promote high-quality, sustained-yield, multiple-use management on National Forests and on other ownerships, where applicable.
- Protect all public and private forest resources, commensurate with the values involved.
- Give special emphasis to protection of rare and endangered plants and to significant examples of ecological, archeological, geologic, and historic interest.
- Share expertise in specialities where the Forest Service constitutes the prime source of experience and skills—for example, in timber management, wilderness management, winter sports management, and forest landscape management.
- Cooperate with other Federal, Regional, State, multicounty, and county agencies in resource management, and in planning and economic development programs.
- Develop and promote national programs that meet the Nation's need for timber.
- Promote adequate provision for the variety of forest recreation opportunities needed by the public.
- Help ensure water yields of the quality and quantity needed.
- Help meet the Nation's needs for wilderness and other special environments by carrying out scientific management of such areas and by developing classification alternatives that provide a variety of opportunities.
- Promote high quality wildlife and fish habitat to ensure a desired mixture of types and numbers for public benefit. Give special emphasis to the protection of rare and endangered species of native animals, fish and birds.
- Seek to expand opportunities for grazing and other use of public and private range resources that serve the welfare of local residents and communities.
- Help ensure mineral development with adequate protection of surface resources.

Protect and improve the quality of air, water, soil, and natural beauty.

- Promote practices to protect and enhance environmental quality in management of all forest ownerships.
- Demonstrate high standards of management throughout the National Forest System. Recreation and range uses, timber harvesting, road construction and other resource development and use activities are to be conducted so as to protect and improve land resource quality and productivity.
- Encourage prevention and abatement of air, water, and soil pollution from operations of forestry-related enterprises.
- Promote management actions to reduce adverse impacts on offsite environments affected by all forest ownerships.

Help protect and improve the quality of the open space environment in urban and community areas.

- Extend research efforts to establish the base of knowledge and techniques necessary to better establish, protect, and maintain trees and related vegetation to improve environmental quality in urban and community areas.
- Promote and develop cooperative arrangements designed to assure adequate use of forestry skills and techniques in improvement of the urban environment.

Generate forestry opportunities to accelerate rural community growth.

- Work with all appropriate public and private agencies to provide public services, income, jobs, and amenities in rural areas through planning, resource management, economic development, and manpower programs.
- Seek opportunities for development of forest-based enterprises which will contribute to rural growth rates at least equal to the national average.
- Identify and promote opportunities for community development, including new towns, and ensure that Forest Service programs contribute fully to their growth.

Encourage the growth and development of forestry-based enterprises that readily respond to consumers' changing needs.

- Foster competition and efficiency in the industries that channel forestry-based services, uses, and products to consumers.
- Place a high value on the adequacy to the consumer of forestry products and services.

Seek optimum forest landownership patterns.

- Actively seek a role in public decisions affecting allocations of land among forest and nonforest uses.
- Round out the National Forest System by land purchase or exchange where public ownership will advance public programs. Study and identify opportunities to add to, or eliminate, areas from the National Forest System to assure optimum land use.
- Encourage the combination of small private forest landownerships into economically viable units for resource management and production.

Improve the welfare of underprivileged members of society.

- Use forestry activities to help minority, economically depressed, elderly, handicapped, and youth groups.
- Promote forest recreation opportunities of the kind and location that meet the special needs of the physically or economically underprivileged.
- Encourage the States, other public bodies, private landowners, and industries to give special consideration and assistance to disadvantaged people in forestry programs.

Involve the public in forestry policy and program formulation.

- Seek out and obtain local and national views in the process of policy and program formulation.
- Discharge our responsibilities in ways that make our management processes visible and our responsible people accessible.
- Consult with and seek cooperative action with agencies at all levels of Government, and with private groups and individuals, in programs for resource management and economic development.

Encourage the development of forestry throughout the world.

- Provide highly competent personnel to help developing Nations establish sound forestry programs, and consider such assignments as part of career development.
- Work through international programs to acquire and exchange forestry knowledge and ideas.
- Participate in and provide leadership to international groups and organizations fostering forestry.
- Work with and through other agencies and organizations in formulating U.S. positions on world trade relating to forestry.

Expand public understanding of environmental conservation.

- Promote efforts to provide information to the general public on the vital role of forestry and related environmental conservation.
- Cooperate with and encourage other Federal, State, and private organizations in the development of conservation education programs.
- Help develop methods to assist the Nation's educational system in teaching conservation principles.
- Encourage use of the National Forests for conservation education.

Develop and make available a firm scientific base for the advancement of forestry.

- Conduct research programs needed to ensure the rapid and efficient advancement of programs aimed at obtaining optimum benefits from forest resource management, protection, and utilization.
- Promote research in forestry through cooperative programs with educational institutions and other public and private organizations.
- Make research results rapidly and equally available to all through information, education, demonstration, and technical assistance.
- Foster relationships between research scientists and forest managers that facilitate joint implementation of research results.
- Support professional and vocational education in forestry and related disciplines.
- Support professional societies in forestry and those related to forestry.

MANAGEMENT ENHANCES ENVIRONMENT

Since 1905, the Forest Service has exercised outstanding management efforts to maintain the attractive environment of the National Forest System, which is rich in natural resources and scenic charm. Extending from the Atlantic to the Pacific Coast, the System's 187 million acres of diversified forest and range lands offer dramatic proof that the Service's prudent management has benefited communities, society, and industry.

Some 86 million acres in the System are suited primarily for nontimber purposes; another 97 million acres grow commercial timber on a sustained yield basis. The National Grasslands total 3.8 million acres. Almost 10 million acres of the System are classified as Wilderness and comprise nearly all of the National Wilderness Preservation System established by Congress in 1964. (These areas are included in the 86 million acres mentioned above.)

The abundant wildlife, managed watersheds, and productive rangelands on today's National Forest System are a tribute to the many skilled managers who through the years have used wise conservation practices that maintain a pleasing natural environment. Rapidly increasing populations and technological developments are placing even greater demands upon America's supply of natural resources. These soaring demands for goods and services give continuing urgency to the necessity of protecting the environment on forest and range lands.

Sustained-yield management applied on a multiple-use basis has proved effective. It provides a continuing supply of vitally needed goods and services to the American consumer, while protecting the physical and esthetic values of forests and related lands.

The Forest Service's long-range programs in research, management of the National Forest System, and cooperation with owners of state and private forest lands have protected and enhanced the Nation's forest lands and related environment and will continue to do so. In recent years, the Forest Service has also been able to bring forestry knowledge to residents of cities and suburbs in order to improve degraded environments or to plan for more pleasing natural surroundings in newly opened or expanding suburban areas.

During 1969 the American people became increasingly concerned with protection of the environment. In keeping with the public's demands for action programs, the Forest Service has responded by planning new programs or modifying existing ones. The Forest Service's intensified efforts to protect and enhance the Nation's total environment are highlighted by the following accomplishments during 1969:

Housing

America faces a major environmental problem caused by a shortage of adequate housing for millions of people. The Forest Service directed major management efforts to assure an adequate supply of wood products from the National Forest System to help meet national housing goals established by the Administration. In addition, through research studies, house plans were developed for low-cost wood homes suitable for rural areas. Eleven of these plans have been completed and are available to the public through the Superintendent of Documents, U. S. Government Printing Office, Washington, D.C.

Reuse of Solid Wastes

The recycling of solid wastes has become a national necessity. The Forest Products Laboratory is conducting an experiment in making usable paper from trash recovered in the city dump at Madison, Wisconsin. This effort is the beginning of a more expanded joint project with the Departments of the Interior and of Health,

Education and Welfare to recover values from solid wastes. Reclamation of a substantial amount of the wood fiber now discarded in city dumps would relieve the increasing demands on America's forests. Our Nation's pulp and paper industry already is recycling over 10 million tons of used paper annually, about 18 percent of national production. Sawmill and plywood plant residues are also being used to make pulp and paper and wood products. These combined actions materially help reduce pollution and waste.

Water Management

Environmental improvement is an important consideration in studies now being undertaken in 68 major river basins, in cooperation with many local, State and Federal agencies. The same consideration was involved in a review by the Forest Service of 18 major water resource development project reports prepared by the Corps of Engineers and Bureau of Reclamation.

Federal water quality standards were established on all interstate and coastal streams on National Forests. The Forest Service also participated in studies on nine rivers to determine if they qualify for inclusion in the National Wild and Scenic Rivers System.

Restoration of damaged forested watersheds was continued, including emergency measures on newly burned and heavily flooded areas. Floods in southern California proved the great value of Forest Service preventive measures. Information on landslide conditions is being recorded, as an aid in locating roads to increase travelers' safety and preserve esthetic landscapes.

Manipulation of Vegetation

Revegetation was continued on seriously depleted rangelands, particularly on the drier lands of the West. Brushlands are being converted to grass to increase forage and water yield, reduce fire hazard, and improve esthetics.

Several pilot tests were conducted to assess new methods and techniques in applying nonpersistent pesticides and measuring their efficacy. In insect control, special emphasis is being given to manipulation of biological and natural controls, safer and more efficient application of microbial agents, and the use of more selective and less persistent chemicals.

Wildfires

Millions of acres of forested land were spared from the impact of wildfire through increasingly effective methods of fire prevention and control. Compared with the previous year, 25 million more acres of State and privately owned land were receiving organized fire protection from State forestry agencies, at year's end.

These selected examples illustrate the wide range of Forest Service projects concerned with protection of the natural environment. The major portion of this report includes additional activities.

FOREST SERVICE HIGHLIGHTS OF 1969

Cash Income Again Sets Record

Cash income from sale or use of National Forest System resources reached $321,253,829 in fiscal year 1969, $101.6 million more than in fiscal year 1968. This includes receipts from timber harvests, grazing fees, mineral leases and permits, recreation, and other fees from the 154 National Forests, 19 National Grasslands, and 22 Land Utilization projects. (The National Forest receipts include nearly $7 million from revested Oregon-and-California railroad grant lands, which goes to the Department of the Interior.) Timber receipts accounted for $306,-810,625 of the total, more than $100 million greater than the year before. Grazing receipts were $4,437,710 or $354,807 more than in 1968. Forest Service income from all National Forest programs in fiscal year 1969 was $372.5 million, compared with $258.7 million in f.y. 1968.

States Receive $77.8 Million

The States receive one quarter of National Forest timber and grazing receipts each year to help support schools and roads in counties containing National Forests. During the latter half of calendar year 1969, the amount distributed from fiscal year 1969 receipts was $77,838,380, about 50 percent more than the $52.3 million in

1968. Three-quarters went to the three timber-rich States on the West Coast—Oregon, $30.1 million; California, $15.7 million; and Washington, $12.9 million. Montana received $4.2 million; Idaho, $4.0 million; Arizona, $1.4 million; and Mississippi, $1.2 million. Receipts from National Grasslands and Land Utilization areas during calendar year 1969 were $2,023,553, slightly less than in 1968. Affected counties received payments totaling $505,888.

Recreation Use and Facilities Keep Rising

Recreation use on the National Forests and National Grasslands continued to rise sharply; a total of 162.8 million visitor-days of use was reported in calendar year 1969. To help meet this increase, 331 new camp and picnic sites were developed for an overall gain in capacity of 5,643 persons at one time. This brought total one-time capacity of all these sites to 514,471. And at boating, swimming, and winter-sports sites, a net gain in capacity of 30,367 persons brought their total capacity to 652,606 people. Two new Visitor Centers were opened in 1969.

New Wildernesses

The Ventana and Desolation Valley Primitive Areas in California were added to the National Wilderness Preservation System in 1969, increasing by 161,131 acres the area of National Forest lands included in the System, to a grand total of 9,940,219 acres. Congress is considering seven other areas for Wilderness classification; the Forest Service completed public hearings on three additional areas during 1969. The remaining 17 Primitive Areas are in varying stages of review for proposed Wilderness classification.

Breeding Super-Trees

A bright future for developing super-trees of various species is indicated by recent genetics research in southern pine. Selective breeding and intensive culture may produce insect-and-disease-resistant trees with such qualities as rapid growth, good form, and desirable wood traits. Also, irrigation and fertilization seem to show growth promise for trees in certain situations. Superior strains of cottonwood trees developed by genetics research are already being released for commercial multiplication.

Reducing Insect, Disease, and Fire Damage

In insect and disease research, special emphasis is being given to deliberate manipulation of natural control agents; safer and more efficient application of microbial agents; use of more selective and less persistent chemicals; and use of deterrents, repellents, and sex attractants —all so as to achieve necessary control without undue hazard to other forms of life.

The extent and seriousness of air pollution damage to various tree species are being probed through remote sensing techniques.

"Operation Skyfire" research may result in spectacular reduction in lightning-caused fires. A better way to detect lightning and small fires and to map big fires has been shown to be practical. Fire behavior research may help prevent future disaster fires.

Severe Floods Test Control Projects

Phenomenal rains and floods in the Los Angeles River Flood Prevention Project dramatically proved the worth of Forest Service flood prevention measures, including intensified fire control. Adjoining untreated areas suffered severe damage and are being given special emergency treatment, as are six critical West Coast burned areas, to prevent future loss of life and serious damages.

Timber Harvest Dips, But Income Rises

Although unfavorable logging weather dropped the timber harvest of fiscal year 1969 below that of a year earlier, higher stumpage prices sent income from timber sales soaring to $306.8 million, compared with $205.6 million in 1968. The 1969 fiscal year harvest was 11.8 billion board feet, 0.3 billion less than the 12.1 billion bd. ft. of 1968 which had tied the record high of 1966. The first 6 months of f.y. 1969 (July through December 1968) set a record pace, but early snows and inclement weather slowed down the harvest for the rest of the period.

Reforestation

On National Forest lands, 256,545 acres were planted and seeded to trees in fiscal year 1969. Over 88.3 million trees were set out on these

lands. In addition, 43,868 acres regenerated naturally after site preparation, for a total of over 300,000 acres reforested.

On State and private forest lands, 1.12 million acres were reforested under the Cooperative Forest Tree Seedlings Production Procurement and Distribution Program.

More Low-Cost House Plans Released

Five more plans for wooden houses for people with low to moderate incomes were developed and made available during 1969. They supplement the six plans released in 1968. The low-cost houses feature two to five bedrooms, efficient use of wood, and simple design. Some offer innovative design for maximum use of space. A brochure describing each house, and detailed building plans for all houses are available from the Superintendent of Documents, Government Printing Office, Washington, D.C. The plans are the Forest Service's contribution toward alleviating the critical housing shortage faced by low- to moderate-income families, especially in rural areas.

Small Wood Product Firms Aided

The Forest Service last year helped two small businesses in the Southwest, operated by disadvantagd minority groups. Besides assisting a cooperative at Ojo Caliente, N. Mex., to organize for production of Spanish-style furniture and wooden toys, the Forest Service contracted for signs to be used in National Forest areas in New Mexico, Arizona, and Texas. For a small wooden toy shop at the Jemez Indian Pueblo in Sandoval County, N. Mex., Forest Products Laboratory scientists and other experts developed an acceptable finish for use on wooden blocks. The Small Business Administration then granted a loan to erect a factory building. Members of the tribe are now producing toys, blocks, and puzzles for some 80 firms around the country.

Range Improvement in Depressed Areas

Following a detailed study of rangeland conditions, needs, and potential in over 100 economically depressed counties, grouped by regions, the Forest Service is planning an accelerated development of the range resource where it is a major factor in the economic life of these counties.

Third Union Helps in Job Corps Training

The Brotherhood of Painters, Decorators, and Paperhangers became the third trade union to help train disadvantaged young men in vocational skills at Civilian Conservation Centers in the Job Corps program. Already participating at 21 centers were the International Union of Operating Engineers, and the United Brotherhood of Carpenters and Joiners. Together they provide 640 specialized training opportunities. During 1969 more than 270 enrollees were trained and placed in jobs paying more than $3 per hour. The value of completed projects exceeded $11 million, of which more than 80 percent was conservation-related work on National Forest System lands.

The Forest Service also participated in Cooperative Manpower Training programs designed to elevate the social and economic level of rural people. More than 2 million man-hours of enrollees' time were spent in Operation Mainstream, Neighborhood Youth Corps, New Careers, Work Incentive Program, Work-Study, and training under the Manpower and Training Development Act. These programs helped people of all ages in depressed areas gain enough skills for regular employment.

NATIONAL FOREST SYSTEM —

THE FOREST SERVICE is responsible for managing, developing, and protecting 186.7 million acres of land and its resources in the National Forest System. This includes 154 National Forest units in 40 States and Puerto Rico, containing 182.7 million acres; 3.8 million acres of National Grasslands; and 149,093 acres of land utilization projects... Under multiple use and sustained yield, these lands are administered for their five basic resources: Outdoor recreation, forage, timber, water, and wildlife.

MANAGEMENT and PROTECTION

Management of the National Forest System helps to strengthen rural resources and stimulate rural growth, through these activities:

Timber sales and stand improvement

Rangeland improvement for livestock and wildlife

Increasing available water

Protecting watersheds from erosion and restoring damaged areas

Making recreational improvements

Protecting forests from fire, insects, and disease

Building roads, bridges, trails, visitor centers, and other facilities

Consolidating land holdings for more efficient management.

The range resource management program in 1969 contributed significantly to revitalizing the economic life of rural communities. Livestock operations based on National Forests and National Grasslands produced and sold an estimated $208 million of livestock products. These shipments generated economic activity in other sectors of the rural economy amounting to about twice their value. These operations also provided about 20,000 man-years of direct employment and generated about twice as much indirect employment. Many of these jobs were in areas of underemployment.

In 22 States more than 100 economically depressed rural counties which depend significantly on National Forest System range resources were identified in connection with the long-range planning effort. These were grouped into areas which coincided with regional development areas—such as the Ozarks and Four Corners Regional Development Areas. Range resource development needs have been determined for these areas, and production potentials estimated. Accelerated development of the range resource is planned for these areas to increase production.

This is just one way in which the resources of the National Forest System—wood, water, wildlife, forage, and recreation—are managed and protected by the Forest Service to benefit the American people.

Record Timber Sales Deposit to Treasury

A record deposit of $306.8 million from National Forest System timber sales was made in the U.S. Treasury during fiscal year 1969. This was half again as large as the deposit of $205.6 million for fiscal year 1968, which had set a previous record.

Unfavorable logging weather dropped the fiscal year 1969 timber harvest of 11.8 billion board feet 0.3 billion ft. below that of a year earlier. This total includes all measurable forest products—sawtimber, pulpwood, posts, poles, pilings, etc. The 12.1 billion board feet harvest of fiscal year 1968 had tied the record high reached in 1966. The first 6 months of fiscal year 1969 (July through December 1968) set a record pace, but early snows and inclement weather slowed down the harvest for the rest of the period.

A volume of 18.9 billion bd. ft. of timber was sold in 23,418 sales. This volume includes 8.8 billion bd. ft. of Alaskan timber, to be cut over a 50-year period. It does not include 1.9 billion bd. ft. of timber offered for which no sale bids were received. In addition, over 785,000 Christmas trees and numerous other miscellaneous forest products such as boughs, greens, fern, cones, seedlings, and naval stores were sold.

Also included in the sold volume of timber were 460 million bd. ft. of additional thinning and salvage material, located primarily in Oregon, Washington, California, Montana, and Idaho. This quantity was in addition to the large volume of sales from other intermediate cuttings and thinnings that are done each year in the National Forests, mostly in the two eastern Regions. Besides these sales, 168.3 million bd. ft. of timber valued at $282,000 was granted free of charge to 103,196 individuals under the Secretary's Free Use Regulations S-26 and S-27.

Progress in harvesting the allowable annual cut under multiple use-sustained yield management for the past 5 years is shown in the following table:

Harvesting the Allowable Annual Cut

[Volumes in billions of board feet]

Fiscal year	Annual allowable cut [1]	Actual volume cut	Percent of allowable cut harvested	Actual volume sold	Percent of allowable cut sold
1965	12.0	11.2	93	11.5	96
1966	11.9	12.1	102	11.4	96
1967	12.4	10.9	88	11.7	95
1968	12.3	12.1	98	11.7	95
1969	**12.8**	**11.8**	**92**	**18.9[2]**	**148[2]**

[1] Annual allowable cuts include only sawtimber for National Forests west of the Great Plains and in Alaska, and sawtimber and convertible products for National Forests in the eastern half of the United States.

[2] Actual volume sold includes Juneau Unit Sale in Alaska of 8.8 billion bd. ft. to be cut over a 50-year period.

Timber Inventories and Plans For 4,543,000 Acres

New timber management plans were approved for 13 working circles during fiscal year 1969. These plans cover 4,543,000 acres of commercial forest land. This compares with 13 plans for 2,646,000 acres in fiscal year 1968.

Reforestation and Stand Improvement

Major reforestation and timber stand improvement (TSI) accomplishments in fiscal year 1969 are shown in the following table:

Type of work	Financed from			Total
	Forest land management appropriation	Deposits by timber purchasers	Anti-poverty and other programs	
	Acres	*Acres*	*Acres*	*Acres*
Planted	83,704	118,272	1,849	203,825
Seeded	28,751	23,919	50	52,720
Natural regeneration on prepared sites	11,136	32,732	—	43,868
Total reforestation	123,591	174,923	1,899	**300,413**
Release	70,813	102,215	3,334	176,362
Thinning	50,988	87,110	1,906	140,004
Pruning	631	3,662	589	4,882
Total T.S.I.	122,432	192,987	5,829	**321,248**

Our nurseries at 14 locations produced 96.7 million trees; 4.7 million more were grown at State nurseries for planting on National Forest land. Our extractories processed 48,085 pounds of clean tree seed from cones purchased largely from local people. An additional 18,318 pounds of clean seed were purchased from tree seed companies or extracted at State nurseries.

Seed orchards were established on 288 acres, and seed production areas on 97 acres. Establishment of seed production areas has been essentially completed. An increasingly large proportion of nursery stock is being grown from seed produced in seed production areas; 48 percent of the outplanted stock in the Southern Region was from that seed source in fiscal year 1969.

Thinning operations were primarily in young conifer stands. Release work was done in young hardwood stands and in young conifer stands overtopped by brush.

Also, 80,407 acres were burned over by controlled fires for silvicultural purposes; 27,861 acres as a site preparation measure, and 52,546 acres to control undesirable vegetation in the understory of southern pine stands.

Total planting, seeding, and timber stand improvement accomplishments declined in fiscal year 1969. This resulted from less work done with deposits made by timber purchasers because of higher unit costs. Accomplishments for the past 5 years are as follows:

Reforestation and Stand Improvement

Year	Acres			
	Planted and seeded	Natural regeneration on prepared sites	Total reforested	Stand improvement
1969	**256,545**	**43,868**	**300,413**	**321,248**
1968	268,878	52,386	321,264	364,325
1967	256,926	33,717	290,643	422,885
1966	236,840	51,091	287,931	425,634
1965	232,742	26,072	258,814	434,273
Total	1,251,931	207,134	1,459,065	1,968,365

Note: The gradual decline in T.S.I. accomplishment over the period reflects a long-term trend toward more costly thinning in place of less costly release.

OUTDOOR RECREATION

Besides its great appeal to many millions of nature-loving Americans, outdoor recreation in the National Forests stimulates the economy of many rural areas because recreationists spend considerable money in local communities.

Recreation use on National Forests continued its steady upward trend in 1969. This surge was matched by increased demand for a wider range of facilities and activities. Much of this recreation use is dispersed; i.e., confined to roads, trails, streams, woodlands, and scenic areas, and requires few facilities. However, camping, picnicking, boating, swimming, and winter sports require specially developed sites to assure the health, safety, and enjoyment of visitors.

New Camping, Picnic Sites

To help accommodate this increase, the Forest Service developed 331 new campground and picnic sites during fiscal year 1969, 133 more than the year before. Many were major sites. Many small sites were retired—mostly in Primitive Areas and Wilderness where such facilities are not appropriate—making a net loss of 785 sites. However, the gain in total accommodations was 5,643 persons at one time. The total one-time capacity of such sites is now 514,471 persons.

Facilities for camping are generally designed to accommodate 15 to 30 family groups of 15 to 30 people each, with a spacing of about three or four family groups per acre. The following table shows the changes in the number and capacity of campgrounds and picnic sites and in overall capacity during the past fiscal year:

Campgrounds and Picnic Sites

	June 30, 1968	June 30, 1969	Increase 1968-69
Number of developed sites	7,665	6,880	−785
Area occupied (acres)	44,828	43,977	−851
Capacity, persons at one time (PAOT):			
Camping	396,999	401,285	[1] 4,286
Picnicking	111,829	113,186	1,357
Total: camping and picnicking (PAOT)	508,828	514,471	[1] 5,643

[1] Includes expansion of established sites.

New Skiing, Boating, Swimming Sites

Areas such as ski and winter-sports areas, organization camps, resorts, swimming sites, boat-launching ramps, and similar sites also require more intensive development. (These facilities are provided by both private and public funds. Commercial facilities developed with private funds are authorized by special-use permits.) The net increase in capacity on these sites was 30,637 persons at one time, principally on winter-sports, boating, and swimming sites.

The changes in accommodations at these areas during the past fiscal year are shown below:

Special Facilities

	June 30, 1968	June 30, 1969	Net change
Organization camps	570	565	−5
Hotels, lodges, resorts	399	390	−9
Concession sites	163	149	−14
Swimming sites	296	303	+7
Boating sites	726	782	+56
Observation viewpoints	421	434	+13
Winter-sports sites	198	198	—
Total	2,773	2,821	+48
Capacity, persons at one time (PAOT):			
Organization camps	73,661	73,704	+43
Hotels, lodges, resorts	52,871	54,394	+1,523
Concession sites	14,014	12,664	−1,350
Swimming sites	57,415	62,948	+5,533
Boating sites	63,856	70,137	+6,281
Observation viewpoints	24,242	25,511	+1,269
Winter-sports sites	335,910	353,248	+17,338
Total	621,969	652,606	+30,637

Some 19,000 private recreation residences occupy sites on National Forests. Because of increasing demands for other uses on National Forest lands, no new sites of this kind are being established. Most existing ones, however, will remain under special use permit. Fees from recreation residence permits totaled $1,425,000 during fiscal year 1969. Fees from these permits and other special recreation facilities came to $2,468,431 in fiscal year 1969, $201,783 more than a year earlier.

More details on recreation sites are given in table 5 in the appendix.

Recreation Use

We estimate National Forest recreation use in terms of "visitor-days," a unit of measure adopted by Federal agencies for uniform reporting. A "visitor-day" is equivalent to 12 "person-hours" of recreation activity.

In calendar year 1969, 162.8 million visitor-days of use were reported on National Forest System lands. Progress in improving the reliability of reported use figures for the National Forest System continued through the year. Use-measurement studies on many of the 600 major developed sites calibrated in 1966 and 1967 were maintained and are being studied. In addition, some 137 sites were calibrated for the first time in 1969.

Statistical samples of the recreation use on the Allegheny Reservoir in Pennsylvania, the Watauga Reservoir in Tennessee and the San Gorgonio Wilderness in California were successfully completed. These were pilot operations. This sampling technique will be extended to other National Forests. Such calibrated study units will serve as "barometers" with which other National Forests can compare their use estimates. Also, during 1969 the previously developed technique for deriving statistically reliable estimates of the recreation use of large dispersed areas was applied to the Flaming Gorge National Recreation Area in Utah and Wyoming.

Developed sites on National Forest System lands during calendar year 1969 had 63.7 million visitor-days of use. Half of this use (49.7 percent) was on family and group campgrounds; organization camps provided an additional 9 percent. Family and group picnic grounds accounted for 7.5 percent of the total use of developed sites for the year. Recreation residences accounted for 12.5 percent, and hotels, lodges, and resorts combined, 6.3 percent. Winter sports provided 8.9 percent of the recreation use of developed sites.

Time spent by visitors in forest recreation was also measured by activity actually engaged in. Measured in this way, camping (family, group, and organization) took up 28.3 percent of their time; mechanized travel, 23.2 percent (90 percent of this by car); hunting and fishing, 17.8 percent; recreation residence and re-

sort use, 7.4 percent; water sports, 4.8 percent; picnicking, 4.2 percent; winter sports, 3.6 percent; hiking, mountain climbing, and horseback riding combined, 4.3 percent; and viewing scenes, sports, and the environment, 3.4 percent.

More details on 1969 recreation use, including State-by-State breakdowns, are given in tables 6 and 7 in the appendix.

Recreation Information Management

The special computer-oriented Recreation Information Management (RIM) System, started in 1965, was strengthened during 1969 to improve techniques for field reporting and to validate information on file. Information to assist the public in locating and evaluating campgrounds and picnic grounds, (to inform them as to what facilities are available, length of season, and possible activities at the sites, etc.), is now being sent to numerous publishers of camping directories. Sites are rated according to five development scales, ranging from primitive to modern. This ranking recognizes that the tastes and habit patterns of recreationists differ according to their backgrounds and activity skills. Using the new Forest Service Directory Information System, campers and picnickers can seek sites compatible with their experience and interests, and thus be better satisfied.

Wilderness

During 1969, the Ventana and Desolation Valley Primitive Areas, together with some contiguous lands, were added by Acts of Congress to the National Wilderness Preservation System, increasing National Forest lands in the Wilderness System by 161,131 acres to a total of 9,940,219.

The new wildernesses are:

California	*Acres*
Ventana Wilderness, Los Padres National Forest	95,152
Desolation Wilderness, Eldorado National Forest	63,469

The High Uintas Wilderness, Ashley and Wasatch National Forests, Utah, was submitted by the President to Congress for its consideration during 1969.

Other proposals presently under consideration by Congress are:

Arizona	*Acres*
Mount Baldy Wilderness, Apache National Forest	6,975
Pine Mountain Wilderness, Prescott and Tonto National Forests	19,569
Sycamore Canyon Wilderness; Coconino, Kaibab, and Prescott National Forests	16,542
Colorado	—
Flat Tops Wilderness, White River National Forest	142,230
Montana	
Spanish Peaks Wilderness, Gallatin National Forest	63,300
Wyoming	
Washakie Wilderness, Shoshone National Forest	196,390

During 1969, public hearings were held on three new wilderness proposals:

Emigrant Wilderness, Stanislaus National Forest, California	105,904
Weminuche Wilderness, San Juan and Rio Grande National Forests, Colorado	334,252
The Blue Range Wilderness, Apache National Forest, Arizona	177,239

The review of the remaining 17 Primitive Areas is progressing. Following is a tentative schedule for future public hearings on Forest Service Wilderness proposals:

TENTATIVE PUBLIC HEARING SCHEDULE [1]

NATIONAL FOREST PRIMITIVE AREA REVIEW

Primitive area name	State	Approx. size (thousand acres)	Published minerals report [2]	Hearing target date
Uncompahgre	Colorado	53	Dec. '68	Fall '70
Sawtooth	Idaho	201	July '70	Fall '70
Mission Mountains	Montana	73	Jan. '69	Late '70
Glacier	Wyoming	177	Sept. '70	Late '70
Aqua Tibia	California	26	June '70	Late '70
Black Range	New Mexico	169	Sept. '70	Late '70
Gore Range—Eagle Nest	Colorado	61	June '70	Late '70
Wilson Mountain	Colorado	27	Jan. '70	Late '71
Popo Agie	Wyoming	70	May '71	Late '71
Salmon-Trinity Alps	California	223	Sept. '71	Late '72
Idaho	Idaho	1,225	Jan. '73	Late '73
Salmon River Breaks	Idaho	217	Sept. '70	Late '71
Cloud Peak	Wyoming	137	June '71	Late '71
High Sierra	California	10	June '71	Late '71
Absaroka	Montana	64	June '72	Late '72
Beartooth	Montana	230	Sept. '72	Late '73
Gila	New Mexico	130	Sept. '72	Late '72

[1] The tentative nature of this schedule must be stressed. There are a number of factors which could change the hearing dates.

[2] Section 4D of the Wilderness Act requires that mineral studies be completed by the Bureau of Mines and the Geological Survey, U.S. Department of the Interior, on all Primitive Areas to be studied for Wilderness classification.

New Visitor Centers Opened

Two new Visitor Centers were opened in 1969: the Gila Cliff Dwellings on the Gila National Forest, New Mexico, and the Wheeler Peak Scenic Area-Lehman Caves on the Humboldt National Forest, Nevada. Both were provided in cooperation with the National Park Service. Also, a unique popular interpretive display, called the Stream Profile Chamber, was opened on the Eldorado National Forest near Lake Tahoe, California. It features an actual mountain stream with its native fish and other aquatic life, which can be seen through a 33-foot expanse of 2.5-inch thick glass. A spectacular view of tens of thousands of red Kokanee salmon is provided during the spawning season.

On the Shoshone National Forest in Wyoming, the new Wapiti information station was opened.

The Sylvania Visitor Center is under construction on the Ottawa National Forest in Upper Michigan. Other Centers are planned at Blanchard Springs Caverns, Ozark National Forest, Arkansas, and at Hungry Horse reservoir on the Flathead National Forest, Montana. The last one is provided in cooperation with the Bureau of Reclamation, Department of the Interior.

OCCUPANCY AND USE

Special-Use Permits

National Forest System lands serve about 60 other uses besides those related to recreational or renewable natural resources—ranging from airport beacons and apiaries to warehouses and water transmission lines.

These uses are authorized by special-use permits, easements, or agreements—depending on the type of use and whether the user is an individual, a business establishment, a civic group, or a government agency. The number of permits have been increasing steadily and now total over

45,000. Receipts to the U. S. Treasury from these permits rose from $614,710 during fiscal year 1968 to $684,260 in 1969.

Graduated Rate Fee System

The application of the Graduated Rate Fee System to concessions other than existing winter-sports permits was continued with few problems of administration or implementation.

During the 1969 fiscal year, in cooperation with the National Ski Areas Association and the National Forest Recreation Association, we began to consider applying the Graduated Rate Fee System to existing winter-sports permits. Considerable data have been collected on financial factors and site characteristics from both National Forest and private land-based operations.

Landscape Management

Environmental design, or landscape management, is developing rapidly as a new skill in multiple use management. This concept means that landscape or scenic values will be considered on a basis fully equal with that of the other resource values. Landscape management identifies and marshals the skills and technical means needed to protect and enhance National Forest landscapes. Good environmental design plans for and develops the balanced wise uses which the commodity resources of the landscape must also support. Landscape management is a sophisticated development that is becoming more useful in administering National Forests so as to extend the range of their public values and benefits.

To further this development, the Forest Service planned and conducted special seminars in landscape management for National Forest administrators and their staffs. Last June an interdisciplinary group met in a service-wide conference to start the preparation of a handbook and supporting training materials for use in landscape management work on the National Forests.

The Forest Service now employs the Nation's single largest force of practicing landscape architects. Their unique professional talents are directed toward environmental protection. Experts in several functional fields are now applying time-tested design principles to the various sciences involved in land and resource management.

RANGE MANAGEMENT

Over 60,000 farm and ranch families, mostly small operators, graze livestock on the 106 million acres of public rangelands in the National Forest System. Some 40,000 of these operators hold free-use permits.

In 1969 the Forest Service studied its long-range responsibilities and goals in managing these public rangelands, which are used for grazing and browsing both by domestic livestock and wildlife. The need for providing national leadership in forest range conservation, development, and utilization was re-emphasized. A balanced 10-year program was developed, considering both the resource needs and the socio-economic impacts on rural communities. The short-term objectives emphasize revitalizing rural areas as well as arresting and reversing the widespread decline of environmental quality.

Major Accomplishments

Some major accomplishments in range resource management and development during fiscal year 1969:

Range allotments for which an analysis is completed and a management plan prepared (an increase of 475)	5,979
Range allotments for which an intensive management plan is in effect on the ground (an increase of 600)	4,600
Acres of depleted rangeland revegetated by cultural means:	
With federal funds	177,980
With cooperative funds	51,028
Total	229,008
Miles of range fences constructed:	
With federal funds	1,382
With cooperative funds	812
Total	2,194
Range water developments for livestock and game:	
With federal funds	1,395
With cooperative funds	729
Total	2,124

Ecomanagement

Ecomanagement, a broadened concept of land management, is rapidly becoming a reality in the range management activities of the Forest Service. It results in a more positive form of multiple-use management. Range managers go beyond the harmonizing of uses and try to **complement** one use or activity with another.

An example of this is the role of range ecologists in the Northwestern Region of the Forest Service. These people are now working not only in rangeland areas considered good wildlife habitat, but also act as consultants throughout the Region on forest and other management problems. They exercise leadership in developing management criteria for plant species that have economic and recreational importance as "special products" in the Pacific Northwest. One of these, false-hellebore, is widely used for medicinal purposes.

In the Southwest and in Southern California, cover-type modification is being carried out in the chaparral type. Here the multiple objectives are to increase forage production, reduce fire hazard, increase water yield and water quality, enhance wildlife habitat, and upgrade the esthetics of the environment.

Intensive ecomanagement is being applied at two widely separated forest range areas—one in northeastern Oregon and one in Florida. These are joint efforts between Forest Service range managers and research scientists. The objective is to demonstrate the economic feasibility of multiresource ecomanagement.

On the Florida demonstration area, treatment consists of clearcutting strips through the solid timber stand, fertilizing them, and seeding them to grass. The strips are prescribed-burned on a rotational schedule to improve the palatability and nutritive value of the forage. The forest floor in the timbered lands is being disked and planted to partridge pea and Florida beggar weed. It is expected that the area will produce a sustained flow of high-quality pulpwood, that cattle numbers and quality will increase, an excellent habitat for wildlife will result, and deer, turkey, and quail populations will increase several-fold. Hunting conditions will improve. The savannah-like aspect will provide pleasing vistas in an otherwise heavily timbered area.

The demonstration venture in northeastern Oregon is in the planning stage. Intensive practices have not yet been applied. Tentative plans call for release of stagnated timber stands, improvement of the forage resource and wildlife habitat by cultural techniques, and improved livestock management. An analysis is being made to determine what ecological modifications need to be made and what responses may be expected.

Indian Treaty Grazing Rights

A Forest Service and USDA position has been worked out in collaboration with the Office of the General Counsel in regard to Indian Treaty grazing rights on National Forest System lands.

A specific controversy between the Ute Indian Tribe in northeastern Utah and the Forest Service has been settled. Free grazing permits were issued to the tribe with provisions for controlling numbers, seasons of use, and other management considerations. A mutual statement of position supplemented the grazing permits. This procedure will serve as a prototype in settling similar claims in other parts of the West.

Grazing Use and Receipts

In calendar year 1969, 1,624,802 cattle and 2,185,288 sheep, exclusive of offspring, grazed under permit on National Forest System lands. This represented an increase of 93,746 cattle and a decline of 24,964 sheep as compared with 1968. (The calendar year 1968 figures of 1,531,-056 cattle and 2,210,252 sheep represented an increase of 10,477 cattle and a decline of 53,325 sheep as compared with 1967.)

Grazing receipts for fiscal year 1969 amounted to $4,437,710, an increase of $354,807 over fiscal year 1968. Of these receipts, $3,842,344 was from National Forests, and $595,366 from National Grasslands and Land Utilization areas.

Grazing Fees

Nine years of exhaustive effort culminated in the Jan. 14, 1969, announcement by the Bureau of the Budget that a new and higher grazing fees system was going into effect on public lands administered by the Departments of the Interior and Agriculture. The new fees system was implemented on the western National Forests in 1969. That the public was keenly interested in the fees matter was indicated in corre-

spondence received by the Department of Agriculture. More than 1,300 comments, about equally divided between supporters and opponents, were answered.

The strong interest and concern of livestock, conservation, and related groups were also reflected in Congress. The Forest Service testified at hearings held in both chambers.

The grazing fees issue also entered the courts. One suit was entered against the Secretary of Agriculture and the Secretary of the Interior by a permittee in New Mexico who was grazing livestock on Forest Service and Bureau of Land Management lands.

The suit looked for court action that would declare void the regulations or collection of increased fees or termination of grazing permits or licenses for failure to pay increased fees. The Court dismissed the case in favor of the two Secretaries. The case has been appealed to the United States Tenth Circuit Court of Appeals in Denver and will probably be heard in 1970.

WATERSHED MANAGEMENT

Increasing Water Yields

The bulk of the Nation's streams originate in forest areas. About one-fifth of the Nation's water yield comes from National Forests. In the western States, National Forests produce 70 percent of the water for irrigation.

Recent Forest Service investigations have shown that substantial and significant increases in water yields can be obtained in selected National Forest areas, through more intensive forest and range management. The cost is equal to or below that of other methods of increasing water supplies.

In the Pacific Southwest, for example, about 900,000 more acre-feet of water could be produced in an average water year by judicious application of hydrologic principles in the planning design of current National Forest management programs—such as: Timber harvest, wildlife habitat and range improvement, and fire presuppression. This yield amounts to almost half the total natural potential for increasing onsite water yields from National Forest System lands in this area.

This improvement can be achieved without sacrificing other resource values. It is therefore in harmony with the protection and management of the total natural environment of the Pacific Southwest.

On the basis of limited experience on small areas, about half of this 900,000 extra acre-feet could be produced at an added cost of less than $10 per acre-foot to onsite operational programs. In the Pacific Southwest, the potential for reducing sediment volumes is about 14.5 million tons a year. Over 90 percent of this can be achieved for less than $4 per ton.

The second phase of the Pacific Southwest survey—an intensive survey and analysis of the operational potential of five representative areas—is well underway.

The results of reconnaissance investigations, covering 15 million acres in 1969, are being utilized to plan areas for future sound operational programs on the National Forests.

Wild, Scenic, and Recreational River Studies

The Wild and Scenic Rivers Act (P.L. 90-542) directed that studies be made of 27 rivers named in the Act to determine whether or not they should be incorporated into the National Wild and Scenic Rivers System. The Forest Service will be the lead Federal agency in the study of nine of these rivers. They are the Chattooga in Georgia, North Carolina and South Carolina; the Flathead in Montana; the Illinois in Oregon; the Pere Marquette in Michigan; the Moyie, Priest, St. Joe, and Salmon, all in Idaho; and the Skagit in Washington.

Each river study is done cooperatively with various Federal, State, and local agencies and other interested parties. The complete study report will be submitted to the President and the Congress by the Secretary of Agriculture with his recommendations and the views of other Federal agencies and the States concerned.

During 1969 a major effort was conducted on the Chattooga River study. Starts were made on the Pere Marquette, Salmon, and St. Joe studies. Preliminary discussion and planning were initiated for the remaining five rivers.

Impact Surveys, Recreation Facilities, and Land Treatment

Impact surveys delineate the effects of reservoirs and other water development projects upon the protection, administration, and management of National Forest System lands. They also determine the effects of such projects on forest users and permittees, and on the economy and environment of rural communities. The surveys provide the basis for recommendations on replacement, mitigation, and enhancement measures. They also identify National Forest opportunities to enhance project purposes. Reports are made available to a construction agency to aid in planning.

Before and during construction, a Forest Service liaison officer works with the construction agency. Some of the direct local and national economic and social dividends derived from this program are:

(1) Protecting the land and resources, including appropriate attention to natural beauty, water quality, and the environment;

(2) Minimizing interference with regular protection and management activities;

(3) Facilitating operations of the construction agency.

In fiscal year 1969, impact survey work and/or construction liaison went on at 454 projects, as compared with 346 for 1968.

To provide for optimum use of water development projects within and adjacent to National Forest System lands, the Forest Service, in cooperation with construction agencies, provides and administers facilities for public access and use on and adjacent to project reservoirs. In fiscal year 1969 such facilities were provided at 44 separate projects, as compared to 37 for 1968.

To achieve the full potential of water development projects frequently requires specifically prescribed treatment of tributary National Forest System lands. Such treatment by design:

(1) Minimizes reservoir siltation; (2) Beneficially affects the quality and quantity of water inflow to the reservoir, and (3) Enhances scenic and other public use values.

In addition to the tributary land treatment program, reservoir sweeping and debris removal reduce shoreline maintenance costs, increase reservoir use, and provide a safer and more esthetic environment for the public. During fiscal year 1969, tributary land treatment measures were applied and/or reservoir sweeping and debris removal were provided at 71 projects, as compared to 30 in 1968.

Water Quality

The Forest Service is now using Federally approved water quality standards for all interstate and coastal streams in National Forests. Numerical and descriptive limits for water standards have been set for activities which affect the water resource. A specialized system to check on National Forest land management and use activities as they affect quality of water is being operated at 41 locations. About 90 percent of the western population depends on high quality water from National Forests.

Restoration of Damaged Watersheds

Although rehabilitation of damaged areas is progressing in all parts of the country, much of this work still needs to be done. Rehabilitation work is coordinated with that of other resources and service divisions to accomplish an integrated program of management under multiple use.

An example of community interest and cooperation is the Ferron City Watershed in Utah. Rehabilitation of the watershed was necessary. An agreement was made and approved by local people to reduce land uses enough to help restore soil stability. In 1969, the local community contracted for construction of a multiple-use reservoir that furnished a more reliable water supply, increased the recreation potential, and provided more flood control.

During 1969, we provided technical assistance and recommended protection requirements for roadbank stabilization along 45 miles of State roads in the Chugach National Forest of Alaska. This work is helping to preserve water quality for anadromous fish (salmon), improve land use, and enhance the esthetic quality of the rural countryside.

In fiscal year 1969, Forest Service crews treated and stabilized 30,000 acres of sheet-eroded and deteriorated areas, 100 miles of gullies, 20 miles of streambanks, 3 miles of shorelines, 700 miles of roads and trails, and 900 acres of lands disturbed by surface mining and prospecting. These measures enhance a quality forest environment.

Treatments continued in the restoration of favorable watershed conditions on lands dam-

aged by wildfire. Emergency measures (initial treatment on new burns and maintenance on older burns) were applied on 37,000 acres damaged by 10 fires. These areas required onsite protection and posed threats to life, property, public health, and functioning of watersheds.

Major Floods

Two catastrophic floods seriously affecting National Forest lands occurred in 1969—the January-February floods in Southern California, and the August 1969 floods associated with Hurricane Camille in Mississippi, Virginia, and West Virginia. Special funds were approved by Congress to supplement regular appropriation funds for emergency soil and water reclamation activities. One Forest Service employee lost his life during rescue operations in California.

Record Snow Pack

Deep snow fields at higher elevations in the West are a valuable source of water in streams during the summer months. These deep snows can also cause floods and avalanches. In 1969 new record depths of snow were noted in many areas of the West, Lake States, and Northeast. Measurements were conducted on the 1,100 snow courses in the National Forests. Watershed scientists prepared advisory reports on local flood potential and snow safety for forest users.

Soil and Geologic Resources Programs

Increasing emphasis is being placed on getting soil resource inventory information into the early planning stages of resource management on a district-wide and forest-wide basis. The Siskiyou National Forest in Oregon, for example, has developed specific management recommendations pertaining to road construction and logging on each of the important soil stability groups on the Forest. The Olympic National Forest in Washington has developed a transportation planning procedure which incorporates much of the soil stability information provided in their soil resource inventory.

The Payette and Boise National Forests in Idaho are applying reconnaissance soil and hydrologic information to a wide variety of resource use and activity plans.

An objective of applying soil resource information on a systematic basis is to minimize soil and water management problems by avoiding hazardous or critical soil areas. Soil surveys indicate the potential problems where these areas or situations cannot be avoided. During the past year, soil scientists completed 3.6 million acres of soil resource inventories and 2.1 million acres of detailed soil surveys.

Soil scientists also completed some 500 investigations consisting of site examinations and appraisals, surveys of small areas, and related consulting services. These investigations are management-oriented and usually involve operational projects.

In soil management, some 1,500 acres of young forest stands were fertilized is a new pilot project on the North Tongass National Forest in Alaska. Joint studies by soil scientists and foresters indicated that tree growth in this area could be greatly accelerated—up to double on selected soils and tree stands—by adding nitrogen. In conjunction with this pilot program, the State Fish Game Department, the Interior Department's Bureau of Commercial Fisheries, and the Forest Service's Pacific Northwest Forest and Range Experiment Station have been invited to monitor water quality in the area's streams as a positive check of environmental quality.

The Chippewa National Forest in Minnesota has developed and initiated a program of classroom and field work to train soil and water technicians. The trainees are selected from unemployed minority groups in the area. The initial group has graduated and all have been employed in various phases of soil and water work. A second group is now in session.

Interpretation of geologic data is necessary for efficient land management planning. An increased effort is being made to utilize this science. Geological field work has been completed on 523,000 acres of National Forest land in the four Southwestern Regions. Field work includes seismic probes which supply data about conditions below the earth's surface. This information would otherwise be unknown or only conjectured. This past year, work was confined to the Pacific Southwest Hydrologic Survey, Phase II, primarily to determine rate and direction of groundwater flow and the amount of ground water in storage.

Vital information concerning landslide conditions is being recorded and will be most useful

in preliminary road location. It will promote efficiency and economy of design while increasing safety and preserving an esthetically pleasing landscape.

Geologic mapping can also provide other useful information, such as: (1) Identifying location of well sites for water for livestock, recreation, and administrative uses; (2) Determining the geologic conditions affecting structures such as bridges, dams, buildings, and tunnels where changes in geologic conditions should be known; (3) Supplying descriptions for informational purposes, such as on displays for recreation areas and for general public information; and (4) Identifying geologic materials potentially suitable for borrow pits.

Throughout the National Forests, 226 separate geologic investigations were made for land exchanges, recreation areas, road construction, bridge location, and damsites.

Water Rights and Uses

An inventory of the surface and subsurface water-use needs and rights for existing and foreseeable National Forest purposes in the West has been in progress for several years. About half the inventory has been completed. The States are being notified of these National Forest water needs, as an aid in planning and running their own programs.

MINERALS MANAGEMENT

Minerals management activities significantly increased over the previous year. Renewed interest in prospecting for uranium, silver, copper, molybdenum, and gold prompted the staking of many hundreds of claims on National Forest lands during the year. Occupancy trespass cases received increasing attention. Only a few new applications under the Mining Claims Occupancy Act were received, but action was completed on over 100 cases. Income from mineral leasing on acquired lands increased more than ¾ million dollars over last year's receipts, to a new high of $5,441,284.

Mining and Environmental Control

Several companies in Colorado, Missouri, and Idaho have taken significant steps to protect the ecology of the environment during the exploration, mining, and ore reduction of mineral resources in National Forests.

The American Metal Climax Company (Amax) has cooperated closely with the Forest Service, the Colorado Game, Fish and Parks Department, and the Colorado Open Space Foundation in planning the multi-million-dollar Urad and Henderson molybdenum mine projects in the Clear Creek drainage, Arapaho National Forest. Besides earning the appreciation of the Forest Service, the firm received awards from Sports Foundation, Inc., and *Business Week* magazine.

The Urad mine is located near a well-known scenic ski area. It was so planned and its facilities so placed as to: (1) Maintain water quality compatible with recognized use; (2) provide public recreational opportunities, winter and summer, and (3) create a pleasing appearance. To provide needed surface facilities at Urad, a large earth fill was made and two streams were diverted under the narrow valley floor, while still maintaining natural water flow and averting contamination. One reservoir was built to allow recirculation of used mill water. Another reservoir which supplies fresh water to the plant has been stocked with trout and is open to the public for fishing.

The nearby Henderson mine is still being developed. It will have buildings designed to fit the surroundings through color control, esthetic access roads which preserve trees, a tailings pond located 9.3 miles away through a mountain tunnel, and a millsite far from public view served by a 13-mile railroad built at a cost of $25 million. A previously inaccessible 6,000-acre tract has been opened up to public outdoor recreation —hunting, hiking, and camping. Both mines were developed under the location and entry system applicable to public domain National Forest land.

Six major mining companies are cooperating with the Forest Service on leased land in the Clark National Forest, Missouri. In this "new lead belt," significant progress has been made in environmental protection. The companies are: St. Joseph Lead Co.; American Metal Climax; American Zinc Lead and Smelting Co.; Dresser Industries, Inc. (Cominco operations); Ozark

Lead Co., and American Smelting and Refining Co. (Asarco). Total investment costs in mines, mills, and smelters comes to $175 million. Ore values, principally lead, exceed $2 billion, and are expected to last 50 to 100 years. The Forest Service and the companies have exchanged land to facilitate plant location. Government royalty receipts approximate $2.4 million a year, and have a prospective value of $3 million a year within a few years.

All the companies and contractors involved in the use of National Forest land have by terms of their leases, permits, and agreements taken action to control erosion and prevent stream pollution, to revegetate disturbed areas, and to reduce harmful emissions into the air. They have given maximum consideration to environmental, esthetic, and future multiple-use factors of their areas. To combat the increased fire hazard, the Forest Service initiated a helicopter project to aid in fire detection and early attack.

The Moloc operation, a joint lead mining and smelting venture of Amax-Homestake in the lead belt, was also singled out by Sports Foundation for outstanding achievement by a mining plant in preventing water pollution.

In the outstandingly scenic and game-rich White Cloud Peaks area within the Challis and Sawtooth National Forests in Idaho, the American Smelting and Refining Company (Asarco) has also worked very closely with the Forest Service in all of its mineral exploration activities. Early in 1969 the firm announced discovery of a major molybdenum deposit near Castle Peak, and applied for a special use permit for an access road.

In addition to the road, several alternatives for access and removal of ore in the White Clouds area are being studied, including railroad and tramway, so as to minimize impact on the area's environment. In response to the great public interest for and against the Asarco project, three public information meetings were held. Asarco has employed an ecologist and asked Forest Service researchers to suggest guides for rehabilitation of the area after the mine is worked out. The company has agreed that choice of plant site, and mining and waste disposal methods would be designed to assure the least practical impact on the natural ecology of the area.

Revision of Mining Laws Sought

The Department of Agriculture and the Forest Service took a strong position on revision of the Federal mining laws on public lands, so as to prevent pollution, control erosion, and provide for reclamation and restoration of mined-out land, as well as provide a program more in harmony with the proper management of the renewable surface resources. Some of the principal recommendations made before the Public Land Law Review Commission and the American Mining Congress were:

1. Separation of the surface and surface resources from the mineral resource, allowing only the mineral estate to be patented.
2. Grant of right to occupy the surface needed for the mining operation.
3. Option of the mineral patentee to purchase, at fair market value, and with consent of the agency having jurisdiction, land within the mineral patent area actually needed for mining and processing operations.
4. Provision for the mineral patentee to purchase or use, at fair market value, and with consent of the agency having jurisdiction, land within or in proximity to the mineral patent area, for mining plant sites and disposal facilities. Areas under use permit would be restored and returned to Federal management for other public purposes upon cessation of mining use.
5. Definition of "common varieties" by Act of Congress, and disposal by the agency having surface jurisdiction under a prospecting permit and preference right leasing system.
6. Removal of gem stones, semi-precious stones, and other lapidary materials from location and entry, and disposal by agency having surface jurisdiction under a system similar to "common variety" disposal.

Mining Claims

There were 84 patent applications, involving 556 claims, pending at the beginning of calendar year 1969. Actions on 225 claims were completed during this year—compared with 177 claims completed during calendar year 1968; 17 claims (5 applications) aggregating 262 acres were patented during the 1969 calendar year.

For calendar year 1968, comparable figures were 23 claims, 9 applications, aggregating 1,092 acres which went to patent.

Action in compliance with the Church-Johnson Mining Claims Occupancy Act continued with particular emphasis in the California Region. As of July 1, 1969, a total of 409 cases involved National Forest System lands. Of the 314 cases completed, fee title was offered in 52 cases, a lease offered in 113 cases, 7 were issued special-use permits, and 126 were rejected because applicants were not qualified.

Mineral Leases and Permits

Nearly 19,000 mineral leases and permits cover about 16 million acres of National Forest System lands, and 262 prospecting permits cover nearly 1 million acres. Included are 7,027 oil and gas leases which required action during the year: 3,506 on public domain forest land, and 3,521 on acquired lands. Leases for other leasable minerals total 341, with 74 on public domain lands.

Hardrock leases on acquired lands aggregate 267. Some 1,330 leases are for mineral materials; 1,167 are on public domain forest land. In addition, 1,579 free-use permits were issued for over 20 million tons of mineral materials, mainly sand and gravel. Also 691 mineral reservations and rights are outstanding and are being operated on 200,000 acres.

Total revenue from mineral leases and permits on acquired lands in the National Forest System (mostly in the East) amounted to $5,441,284 in fiscal year 1969. These are credited to the Forest Reserve Fund and Receipts from Submarginal Lands. States and counties share in these receipts. In addition, it is estimated that nearly $22 million in revenues were received from rents and royalties for leases on National Forests and National Grasslands reserved from the public domain (mostly in the West). These receipts are distributed as follows: 52.5 percent goes to the reclamation fund, 37.5 percent to the State in which the leased land is located, and 10 percent to the U.S. Treasury as miscellaneous receipts.

Mine or well-head value of minerals produced from National Forest lands during fiscal year 1969 was estimated at $103 million.

WILDLIFE HABITAT MANAGEMENT

The recreational attraction and use of wildlife resources on lands administered by the Forest Service continue to grow. In calendar year 1969, an estimated 39 million visitor-days were devoted to wildlife attractions on the National Forests—including hunting, fishing, and nonconsumptive uses such as photography and bird-watching. Wildlife visitors spent an estimated $583 million in pursuing these wildlife activities. (This figure is based upon average daily expenditures determined in the National Hunting and Fishing Survey in 1965.)

In addition to the economic value of this resource to rural communities, more than 10,000 miles of streams within the National Forests constitute "nursery" waters for the production of Pacific salmon. It is estimated that more than 30 percent of the salmon taken by commercial and sport fishermen in the offshore waters of the Pacific Coast States originate in streams within the National Forests. Tributary streams of the Great Lakes which originate on the National Forests are playing an important role in the introduced salmon program of that region.

Rare and Endangered Species

Some 47 species of wildlife classed as rare or endangered are known to occur on or in the vicinity of the National Forest System. Habitat management plans were prepared for a number of these and other species having special public interest. The Forest Service continued studies with the Bureau of Sport Fisheries and Wildlife, U.S. Department of the Interior, on the study and management program for the Puerto Rican parrot.

An osprey wildlife management area was established at Crane Prairie Reservoir in the Deschutes National Forest in central Oregon. This is perhaps the first osprey management area in the country, and represents the increasing public interest in the protection and management of raptor bird species. This project is a joint program with the Oregon State Game Commission and the Bureau of Reclamation of the Department of the Interior.

In cooperation with the Audubon Society, progress continued in recording the location of

bald eagle nests and setting up management criteria for the protection of the nesting areas.

A publication entitled "Protecting Endangered Wildlife on Your Southern National Forests" was received favorably by the public.

Nonconsumptive Wildlife Use

Nonconsumptive, or appreciative, uses are playing an ever-increasing role in the management of the wildlife resources on National Forest System lands. In calendar year 1969, an estimated 10.4 million visitor-days were spent on bird watching, wildlife photography, and related activities. The presence of rare and endangered wildlife contributes much to the increased public interest in the appreciative uses.

Although not included in the wildlife nonconsumptive uses, the esthetic values of wildlife are assuming greater importance to the camper, the hiker, and the boater, who consider wildlife an important part of their recreation experience.

Wildlife Habitat Improvement

Wildlife habitat improvement is achieved through the coordination of resource activities and by direct construction projects. The majority of the direct project work is done cooperatively with the State fish and game agencies.

The following habitat improvement work was completed on National Forest System lands in fiscal year 1969. About 52 percent of the total cost was paid by the States under cooperative programs.

Wildlife food and cover improvements:		
Seeding and planting forage	91,623	acres
Release of forage plants	24,001	acres
Prescribed burning	62,939	acres
Protecting key wildlife areas	24,921	acres
Permanent wildlife openings	10,647	acres
Small water developments for wildlife:		
Ponds, troughs, guzzlers, etc.	2,577	items
Waterfowl wetland improvement	3,985	acres
Fish stream improvements:		
Channel structures	528	items
Spawnbed improvement	2,250	rods
Stream barrier removal	226	items
Protecting stream channels	1,911	rods
Rough fish removal	22	miles
Fish lake improvements:		
New fishing lakes	2,613	acres
Fish shelters and spawnbeds	316	items
Aquatic plant control	985	acres
Rough fish removal	43,498	acres

FIRE CONTROL

Through effective fire protection, average annual losses of burned areas on the National Forests have been reduced by 40 percent under those of 30 years ago. And they have been reduced even more compared to 50 or 60 years ago. Over a million acres were spared from wildfire in 1969, in comparison with annual losses in the early 1900's, thereby averting damage to resources of around $120 million. Each dollar invested, therefore, returned over $4. How was it done? What are the payoffs?

Prevention

In fire control, prevention comes first. A fire prevented is one potentially less costly to suppress. The ultimate aim of the Forest Service is to eliminate preventable fires. The fire prevention programs cover a wide range of activities. In 1969, good progress was made in prevention of railroad fires and in solving other chronic problems. A "Statement of Understanding" issued at the national level was agreed to by railroads and forest protection agencies. This is an important first step toward reducing the increasing number of damaging railroad fires. An on-the-ground action program will follow.

In four Regions, concentrated prevention efforts to reduce fires caused by hunters, town dumps, recreationists, and debris burners have greatly reduced fire starts. These accelerated projects will serve as models elsewhere.

Fire prevention programs, like other community benefit programs, must be kept before the public. The new motion picture film, "Man Against Fire," was released in mid-year. The color film and the new series of symbolic fire prevention signs show much promise of helping the battle to reduce man-caused fires.

Preparedness

Not all man-caused fires can be prevented; along with lightning-caused fires, they will con-

tinue to plague protection agencies. A top-flight fire control organization must be prepared to take aggressive initial action on all fires, to keep them as small as possible.

Well-planned and executed training is a vital part of such preparedness. Therefore, during the past year more emphasis has been put on learner-centered training rather than the traditional instructor-centered approach. By focusing on the trainee's knowledge deficiencies, his present knowledge level, and the instructional objective, subject matter can be synthesized to give the trainee only what he needs to know, often at a reduced cost.

Using this method, two national advanced courses were conducted for top-echelon Fire Control personnel. In addition, several master lesson plans and self-instructional texts were published during the year. While more improvement is needed to attain fully learner-centered instruction, the year's training program made significant progress in this respect. The payoff is a better trained and prepared Fire Control staff.

Facilities and operational techniques are other parts of preparedness. A new interagency fire center at Boise, Idaho, was placed into operation under joint management of the Forest Service, Bureau of Land Management, and the Weather Bureau. Boise Interagency Fire Center will provide strong backup forces and equipment for all Federal fire protection agencies throughout the West. An administration building, smokejumper loft, and warehouse were completed in 1969, and construction was started on a barracks-mess hall and a training facility. During the past year, the Center dispatched more than 400 trained fire overhead to help direct fire suppression activities in Alaska. Suppression crews, firefighting equipment, infrared mapping and transport aircraft were furnished to help in this and other western States' firefighting efforts.

Hazard Abatement

Debris created by timber harvest, timber stand improvement, and right-of-way clearing must be disposed of to minimize the fire danger created by these operations. Prescribed fire was used not only to reduce the hazard on thousands of acres but to improve productivity of timber, range, and wildlife.

Perhaps more important than the disposal of hazardous debris was the construction of firebreaks and fuelbreaks, and the conversion of fuels to less flammable conditions. Each of these programs was used to reduce the threat from fire and was aimed at lowering the rate of fire spread, reducing the blocks of continuous hazardous fuels, and providing improved access for men and equipment. The fuel treatment program is a truly "get-ahead" endeavor. Progress has been slow but, where fires have originated or burned into fuel-treated areas, there has been a significant payoff in reduced suppression costs and damages.

New Methods

Equipment development and use goes hand-and-glove with prevention, preparedness, and suppression of forest fires. Each year new equipment and methods are tested, and old, outmoded apparatus is discarded. Notable advancements were made in 1969:

1. Use of a liquid concentrate, fire-retardant solution on fires in the Pacific Northwest. Tests showed these formulations were not only more effective on fires, but reduced manpower handling needs as much as 75 percent.
2. Use of large, modern helicopters, with special sling buckets for dropping up to 1,000 gallons of water and chemicals proved very effective for efficiently delivering firefighters and equipment, and for dousing fires.

Firefighting

Although 1969 was a year of generally high fire danger, the record was good. Drought and high temperatures combined to create extreme fire danger in the West during late summer. For example, it was the driest August in 80 years of record at Walla Walla, Wash. In several places it was also one of the hottest Augusts on record.

In some areas the fire hazard was higher than during the damaging 1967 fire season. Yet, only a few large fires occurred. The Mist Fire in the Superstition Wilderness, Tonto National Forest in Arizona, burned 7,500 acres in June. In August the San Mateo Fire, originating on the Camp Pendleton Marine Base in California, burned 16,840 acres, including 4,930 acres of the Cleveland National Forest. The Rough Ridge Fire began the same day and burned 9,610 acres,

including 8,660 acres of the Wallowa-Whitman National Forest in Oregon.

For the year, 10,034 fires burned 92,026 acres of National Forest-protected area. Of these fires, 5,338 were man-caused. In spite of the extreme fire danger conditions, the burned acreage on Forest Service-protected area was less than half that of the previous 5-year average. Preparedness and aggressive initial attack by fire control forces helped establish this impressive record.

ENGINEERING

Improving the quality of the natural environment was emphasized on all engineering projects during 1969. Progress was achieved in the construction of forest development roads and trails, structures, ski lifts, transmission facilities, reservoirs, and of facilities for preventing water pollution. A technical report, "A Scenic Road—A Basis for Its Planning, Design and Management," was published. Many slide-tape training sessions were held on how to eliminate visual pollution in National Forests.

In 1968 a staff engineer was appointed as USDA member on the Working Committee on Utilities of the President's Council on Recreation and Natural Beauty. The committee published its "Report to the Vice President and to the President's Council on Recreation and Natural Beauty," Dec. 27, 1968. Later, the Forest Service issued its own technical report, "Utility Transmission and Distribution Lines—How to Assure Compatibility with Environmental Values."

Public Health and Pollution Control

Five water pollution control projects were programed for work during fiscal year 1969. Two of these—Pope-Baldwin in California and Diamond Lake in Oregon—were continuing projects; initial planning was undertaken for Big Lake in Arizona, Snake River in Wyoming, and Taylor River in Colorado. Total fiscal year funds for these five projects totaled $2,392,000.

During 1968 and 1969, a joint study was conducted with the Public Health Service on disposal of solid wastes in campgrounds. A report to be distributed early in 1970 will include conclusions and recommendations for improved practices.

Roads and Trails—"Total" Concept

Progress was made in constructing highways, forest roads, and trails so as to correlate economy and safety with esthetics, alinement, and present and future land-use values. For example:

1. Working arrangements with other concerned Federal agencies have been established to implement the National Trails System Act. Studies are underway on the Continental Divide and the Potomac Heritage Scenic Trails. The groundwork for establishing the Pacific Crest Trail Advisory Council is essentially complete.

2. The publication, "Traffic Regulation and Law Enforcement on the National Forest Development Road System," was issued this year. This booklet clarifies the close relationship that is necessary between State, local, and Forest Service officials to provide safety and regulate use on forest development roads.

3. Uniform specifications were drafted for construction of specified roads by timber purchasers. Used with the revised timber sale contract, these specifications will promote more consistency among Regions.

4. A Memorandum of Understanding was executed between the Forest Service and Bureau of Public Roads, clearly defining the authorities and responsibilities of both agencies as related to forest highways. It will provide uniform procedures for coordinating the planning, location, and construction of the highways and will resolve other matters related to use and occupancy of National Forest lands by forest highways. Emphasis is given to protecting environmental values.

During fiscal year 1969, 1,028 miles of roads, 447 miles of trails, and 166 bridges were constructed or reconstructed from regular forest road and trail funds. In addition, purchasers of Government timber under the terms of timber sale contracts constructed or improved 7,577 miles of road and provided maintenance on 29,126 miles.

At the end of the fiscal year, NFS lands were served by 199,042 miles of forest development

roads, 100,257 miles of trails, and 451 landing fields for fixed-wing aircraft.

Table 4 in the Appendix summarizes data on the construction, reconstruction, and maintenance of National Forest (forest development) roads, bridges, and trails for fiscal year 1969.

Signs and Posters

Criteria were completed for Forest Service signs, pavement markings, and hazard markers and delineators for structures. These materials provide better information for the motorist to meet standards of the Highway Safety Act. Adequate signs and marking are essential to apply State traffic codes to all forest development roads, to use State accident investigation systems, and to insure State prosecution of offenses. In cooperation with the Division of Information and Education, the Division of Engineering prepared additional posters and small metal signs which combine art symbols, color, and simple language.

Coordination was maintained with agencies having similar programs. This includes developing common criteria with the International Snowmobile Conference on signs, markers, and trail design; with the Interagency Sign Committee on signs and symbols; and with the National Ski and Ski Bob Associations, the Standards Institute, the GSA, and the Federal Prison Industries on sign manufacture and other matters.

Work with the Bureau of Land Management and National Park Service in developing Government-wide standards for sign symbols is near completion.

Structures

New standard plans for construction of Civilian Conservation Centers were completed jointly with the Bureau of Reclamation. Service-wide standard plans for buildings, featuring timber products, were completed for use in Conservation Center training programs.

Design and construction of buildings for the support of authorized Forest Service programs (including research laboratories, visitor centers, and offices) progressed at a lower level than in previous years.

Now operational is a computer programing for a dam management system. A workshop on buildings, dams, and water control structures brought together architects and engineers of National Forest System and Research to discuss maintenance problems and recommend better maintenance procedures.

Close cooperation was maintained with the ski lift industry, including rope tow manufacturers, to insure better and safer service to the public.

We completed two test installations of a glued laminated timber bridge deck system, which promises to give better performance than the conventional nail-laminated system. In recent years, the poor performance of the latter has contributed to the decline in use of timber for highway bridges.

Equipment and Systems

The Equipment Development and Test program, which now has 101 projects at the three centers, provides forest managers and engineers with current information on technology, equipment, and materials.

We continued developing an improved detector for accurately counting traffic on trails. The detector is activated by a person interrupting a low-intensity, invisible, modulated light beam. The need to reduce costs in trail construction has also led to development of new equipment. A commercial product, the Morrison Trail Blazer, has been evaluated and used in trail construction. It has proven to be a reliable machine capable of building 600 feet of trail per day.

Two new gyro-stabilized trail vehicles are being built under contract. One is an improved model in the 800-pound payload class. The other vehicle is entirely new, designed to carry 2½-ton loads of ore out of a Wilderness area over heavy-duty trails, thereby reducing environmental interference to a minimum.

To reduce or eliminate erosion at the outlets of culverts, two new devices have been developed. One is a flexible downdrain for fill slopes, that attaches to the culvert outlets; 26 are installed for observation in western Regions. Also, in cooperation with the Bureau of Reclamation, a metal "energy dissipator" has been developed to reduce stream-bed erosion downstream from culverts. Two units are to be installed in each Region on a trial basis.

Computers

Work was continued on developing more ef-

fective ways of collecting, measuring, storing, and displaying information using color photography, analytic photogrammetry, digital readout devices, and electronic computers and plotters.

An IBM 1130 computer terminal has been installed for remote ADP processing on the Department's IBM 360 computer. Computer programs developed by the U.S. Coast and Geodetic Survey for analytic photogrammetry were converted to run on this system by the end of calendar year 1969. A stereocomparitor has been installed to complete this photogrammetric system.

A precision electronic line plotter has been installed to prepare maps from numerical information. Computer programs are being developed to utilize data stored in a computer memory system and update it as changes occur, so that needed maps can be drawn automatically with less delay.

A study has been completed to determine the feasibility of providing a telephone hookup to a large computer for Regions 2, 3, 8, and 9. Action is now underway to implement remote data processing for these Regions. The Forest Service Road Design System was converted to run on a UNIVAC 1108.

Equipment Management

In conjunction with the General Services Administration, Motor Vehicle Standards Division, we revised our supplemental specifications and standards for medium and heavy trucks to be compatible with those of GSA. The GSA Standards Division has accepted Forest Service four-wheel-drive vehicle standards for Government-wide use and published them as Interim Federal Standard 00292.

Skills and Methods Development

The new Technical Orientation Training Program for our new engineers was tried out by several Regions with very encouraging results.

Advanced Technical Specialty Training Program, which is designed to provide experts and leadership in certain specialized fields, is well underway in advanced logging systems, materials engineering, and transportation planning.

Information System

A system was launched to provide engineers at all locations with technical information. This Engineering Technical Information System consists of the following programs:

Data Retrieval—A service providing for searching existing information systems and data banks—such as Highway Research Board, Engineer's Service, National Clearinghouse, and Library of Congress—to give engineers or other users abstracts of information on desired subjects.

Technical Reports—The publication of service-generated reports or distribution of out-of-service reports of interest to our engineers.

Field Notes—A monthly publication of activities or subjects less technical in nature than reports, containing information that engineers should have.

Current Awareness—A program to keep engineers aware of recent developments in their fields of interest.

Organizational Restructuring

The Forest Service continued to strengthen its overall engineering efficiency by restructuring regional organizations to provide higher technical expertise and more manageable units.

Surveys and Maps

In fiscal year 1969, we produced planimetric maps for 33,551 square miles and topographic maps for 2,088 square miles. Field offices prepared over 500 specialized maps for timber sales, site plans, and other special needs. Modern photogrammetric techniques were used to study or design more than 200 road locations.

Contracts were let to obtain aerial photographs covering 52,708 square miles of National Forest System lands.

Work was begun on developing systems for displaying engineering and resource information obtained from data banks. The banks would be fed information provided by aerial photography, remote sensing, and other sources.

Property Corners and Lines

Much of the 186 million acres of land in the National Forest System is intermingled with other ownerships in complex patterns. Increasing values of land and resources, and intensified

management activities by the Forest Service and its many adjoining landowners, have demonstrated the need for accurate, plainly marked property lines. (Much of the survey evidence no longer exists for many of the century-old surveys that established the 272,487 miles of National Forest System property lines, and the 1,160,472 property corners that control them.)

About 10 percent of needed property line work has been accomplished to date on the cadastral engineering program that was begun in 1958.

In fiscal year 1969, Forest Service surveyors, in cooperation with the Bureau of Land Management, local registered land surveyors, and interested adjoining landowners:

1. Conducted intensive ground search for 28,640 property corners that control ownership lines between National Forest and adjoining land.

2. Determined that authentic evidence remains at 20,138 of these corners, and that 8,502 corners are lost.

3. Placed new enduring official monuments at 12,337 verified recovered corners.

4. Conducted over 2,850 miles of official cadastral surveys to reestablish 7,846 lost corners needed to mark National Forest property lines.

5. Cleared, marked, and posted 1,953 miles of property lines to Forest Service standards, and 646 miles to interim standards.

6. Inspected and maintained 798 miles of property line and 2,774 property corners to perpetuate and protect them against deterioration and loss.

LANDS—ACQUISITION, ADJUSTMENT, AND CLASSIFICATION

The Forest Service added over 150,000 acres to the National Forest System by purchase during fiscal year 1969. This included 118,000 acres primarily suited for recreation, 26,515 acres of other forest land in intermingled private and Federal ownership, needed to consolidate holdings for more efficient management, and 8,856 additional acres for the Redbird purchase unit on the Daniel Boone National Forest in Kentucky.

Another 107,483 acres of private land were received in exchange for 69,190 acres of Forest Service land in intermingled ownership, to allow more efficient management, for a net gain to the National Forest System of 38,293 acres. In addition, 175,847 acres were received from other Federal agencies. Released to the National Park Service in Washington and Arizona were 681,392 acres, to establish a new National Park, two National Recreation Areas, and a new National Monument.

The Forest Service now administers lands in 44 States, Puerto Rico, and the Virgin Islands. There are no National Forest System lands in Delaware, Hawaii, Maryland, Massachusetts, New Jersey, or Rhode Island.

Details of these transactions follow:

Land Purchases

During fiscal year 1969, 516 land purchase cases were approved, of which 367 cases (118,000 acres) will be purchased with Land and Water Conservation Act funds. These lands have outstanding potential for environmental enhancement and development for hunting, fishing, hiking, camping, swimming, boating, and wilderness enjoyment. Also, 144 cases (26,515 acres) were acquired under the Weeks Law to consolidate the Government's ownership for more efficient administration and to increase the effectiveness of land treatment, resource development, and protection programs.

Purchase of 8,856 more acres was approved for the Redbird Purchase Unit in eastern Kentucky, for a total of 94,252 acres. This unit was established in 1965 in the mountainous headwaters of Kentucky River's South Fork as part of the Appalachia Program. Numerous major floods causing enormous downstream damage have originated here. A ranger district has been set up, and management is starting.

Exchanges and Donations

During the year, 211 land exchanges with private individuals and companies were approved

in which we will receive 107,483 acres and grant 69,190 acres in exchange. From the 169 cases completed we obtained 90,872 acres in exchange for 65,955. The exchange program is steadily increasing in numbers of cases, acreage, and value of properties. We also received 563 acres in eight States worth $113,218 in 11 gifts from individuals and organizations.

Boundary Modifications

Special legislation resulted in substantial boundary modifications for several National Forests in late calendar year 1968 and early c.y. 1969. The Ashley National Forest was extended 109,577 acres by the law which established the Flaming Gorge National Recreation Area in Utah and Wyoming. This acreage was formerly administered by the National Park Service.

The boundaries of the Mt. Baker and Wenatchee National Forests in Washington were retracted by 667,892 acres by the law establishing the North Cascades National Park and the Lake Chelan and Ross Lake National Recreation Areas. These areas were placed under National Park Service jurisdiction.

Other boundary modifications were effected by executive and administrative actions. Establishment of the Marble Canyon National Monument by Executive Order withdrew some 14,000 acres from the Kaibab National Forest in Arizona.

Under authority of the Weeks Law, the Secretary added to adjacent National Forests seven purchase units in Regions 8 and 9 containing 220,000 acres, of which 6,800 acres have been acquired. This action will facilitate continued National Forest acquisitions, needed land ownership adjustments, and other programs in the South and East.

After a detailed analysis, the National Forest Reservation Commission approved extension of the Mark Twain National Forest by 48,000 acres on both sides of the Eleven Point River, a recently authorized National Scenic River. This action will permit additional land purchases in the area. This will help promote timber growth, environmental conservation and landscape protection essential to full public enjoyment of the scenic river.

Transfers from Federal Agencies

To facilitate public land programs, over 66,000 acres were added to the National Forest System through transfers from other Federal agencies.

Through interchanges of land jurisdiction with the Corps of Engineers, some 7,700 acres at Libby Reservoir in Montana and the Cave Run Reservoir in Kentucky were transferred to National Forest status. These lands remain subject, however, to continued use by the Corps for water storage and reservoir management purposes.

Under provisions of authorizing legislation, over 28,000 acres of intermingled parcels of public domain within the National Forests were transferred from the Bureau of Land Management. These were formerly private tracts acquired by the Bureau through exchange.

Nearly 3,200 acres of military-acquired property declared excess at Ft. Douglas, Utah, within the Wasatch National Forest, were transferred to the Forest. A research natural area is planned encompassing much of Red Butte Creek watershed, an area closed to public use for almost 100 years. Because of its restricted use, the area provides an unusually authentic picture of original vegetative and soil conditions along the Wasatch Front.

About 27,370 acres declared excess by the Atomic Energy Commission at Los Alamos, N. Mex., were returned to the Santa Fe National Forest.

Special Studies

An intensive land use and development study of the million-acre watershed of the Big South Fork of the Cumberland River in Kentucky and Tennessee was completed by the Departments of Agriculture and Interior, and the Corps of Engineers. Section 218 of the Flood Control Act of 1968 directed these three agencies to develop alternative programs for the best use of this area. The Forest Service, Soil Conservation Service, and Economic Research Service did the USDA study. We did the forestry sections of the study and report and assisted the Bureau of Outdoor Recreation, Department of the Interior, on portions dealing with a National Recreation Area and other recreation-use aspects. The report was sent to Congress in February 1970.

A comprehensive review of the National Forest units in Ohio and Indiana was completed. Proposals for significant changes in their location will be presented to the NFRC early in

1970. A preliminary program for land acquisition and resource development is being further reviewed.

Other Actions

The Land Classification Division also assisted the Division of Legislative Reporting and Liaison with staff work for reports and hearings in connection with the proposed establishment of the Sawtooth National Recreation Area in Idaho, the Oregon Dunes National Recreation Area, and other pending legislation affecting transfers, sales, and grants of National Forest System lands.

Road Rights-of-Way

Rights-of-way were obtained for 1,618 miles of existing and planned forest development roads.

Cooperative agreements with private landowners allow joint construction and use of road systems to serve intermingled private and National Forest System lands. During fiscal year 1969, 16 new agreements were signed, and 69 supplements were negotiated. They covered 295 miles of existing roads worth $3,768,645 and 111 miles of roads to be constructed at a cost of $2,579,167. The roads to be constructed will provide access to 25.3 billion board feet of National Forest timber and 6.2 billion board feet of private timber. They will also provide access to many thousands of acres of public and private lands for recreation and other purposes.

The Bureau of Public Roads (Department of Transportation) issues easements to States for rights-of-way for Federal-aid highways across National Forest lands after approval by the Forest Service. Eighty-one such cases were processed and completed during fiscal year 1969.

Status and Claims

Accurate, readily available records of landownership and status go hand-in-hand with adequately marked property lines as essential tools in forest management. At the end of fiscal year 1969, ownership records had been completed for about 60 percent of the 17,000 townships in which National Forest System lands are located. If the work is continued at the present rate, the conversion job should be completed in the next 5 years and the records placed on a current maintenance basis. On occasion, the United States acquires color-of-title in a parcel of land through mistake, error, or inadvertence. During fiscal year 1969, 27 quit-claim deeds were signed and delivered to the rightful owners.

FORESTRY PROGRESS through RESEARCH

FORESTRY RESEARCH is carried on by the Forest Service at eight regional experiment stations, the Forest Products Laboratory, the Washington Office, the Institute of Tropical Forestry, and with cooperating universities all over the country. Scientists study ways of improving all forest practices, such as: the growth and harvesting of timber; protection of forests from fire, insects, and disease; management of rangelands and wildlife habitat; outdoor recreation; protection and management of watersheds; efficient and economical utilization and marketing of forest products; and forest economics. A continuing survey provides comprehensive information on the extent and condition of forest lands, the volume and quality of timber resources, trends in timber growth and harvest, and the outlook for future supplies and demands.

The Forest Service developed and made available, especially for people with low to moderate incomes, five more plans for wood houses. These, plus the six plans released in 1968, bring the total to 11 plans available to help alleviate the Nation's critical housing shortage.

Superior strains of cottonwood trees developed by genetics research in the Mississippi Valley are now being released for commercial propagation.

Insect and disease control research is giving special emphasis to deliberate manipulation of natural agents, safer and more efficient applicatior. of microbial agents and more selective and less persistent chemicals, and to use of deterrents, repellants, and sex attractants—to assure control without undue hazard to other life.... A new antibiotic was discovered to be produced by fungi growing close to southern pine roots.

Fire research points to a possible spectacular drop in lightning-caused wildfires, better detection of lightning fires and tiny fires, better mapping of big fires, and effective ways to prevent disaster-size fires.

Hardwood forests in the U.S. could sustain higher harvesting rates for a few years. However, by then increased imports of tropical hardwoods would be needed to fill the gap between supplies and demand that is foreseen by the Division of Forest Economics and Marketing Research.

Skyline logging appears headed for widespread adoption with its benefits of lower costs and less disturbance to land. Mechanized pulpwood harvesting promises to put thinning harvests on the same efficient basis as clearcuts.

Recreation research shows that urban visitors need to be educated in care and use of the natural environment.

More information has been obtained on the practical value of managed grazing, on the combined use of ranges by both livestock and game, on erosion control of gullies and ski slopes, and on other important matters. International forestry activities continue to expand rapidly.

A bright future for developing super-trees of various species is indicated by recent research in southern pines. It appears that selective breeding and intensive culture can develop insect- and disease-resistant trees with rapid growth, good form, desirable wood traits, and special valued characteristics... Irrigation and fertilization seem to be promising practices in certain situations... Computerized data are becoming more and more useful...

Faster Growth for Slash Pine

Slash pine trees may attain 35 feet in height and 8 inches in diameter in only 9 years under intensive culture. In a Florida study, selected slash pines planted at wide spacing responded well to irrigation, fertilization, disking, and cover cropping. The most effective treatment combination was irrigation plus cover cropping —both with and without fertilization. Fertilization also increased flower and cone production.

Such results indicate that by selective breeding and intensive culture, trees can be developed that will grow rapidly, have good form, possess desirable wood characteristics, and resist insect and disease attacks. (*See item 3 under Genetics below.*)

Nitrogen Stimulates Douglas-fir

In western Washington and Oregon, nitrogen added to a 35-year-old Douglas-fir stand increased height increment 62 percent and d.b.h. increment 79 to 160 percent in the first 4 years after application. Fertilizer rates of 200 to 600 pounds per acre were tested. After 4 years, net basal area increment was greatest with 200 pounds because more nitrogen resulted in increased breakage of the trees by snow.

Picturing Nutrient Deficiencies

Trees' needs for fertilization can sometimes be determined by leaf size, color, or shape. Three new Forest Service publications show mineral deficiency symptoms for yellow-poplar, western larch, Scotch pine, black walnut, eastern cottonwood, black locust, sweetgum, and pin oak—by colored illustrations and written description. Colored slides, drawings, and text show leaves and other plant parts with abnormal color or form due to inadequate nutrition. These symptoms indicate what elements are deficient, and sometimes, the degree of deficiency.

Mathematical Model Simplifies Birch Management

A mathematical model has been developed to permit computer simulation studies of natural regeneration of paper or yellow birches. The model expresses the steps in regeneration—from formation of the flower to development of an acceptable stem. It is possible to estimate the number of seedlings obtained under any set of circumstances. These estimates can be used to evaluate the benefits of, or the need for, supplemental cultural measures, so as to achieve maximum return on the dollar investment.

When to Harvest Yellow Birch

The timber grower needs to know at what rate his trees are increasing in value, and when their growth ceases to bring him the rate of return he expects. In a study of the financial maturity of yellow birch, the expected rate of value increase was calculated for trees of various sizes, growth rates, grades, and merchantable heights. It was found that yellow birch trees cannot be grown beyond 22 inches d.b.h. in New England without sacrificing rate of value increase. Where surface defects rule out the possibility of top-grade saw or veneer logs, the maximum size is about 18 inches.

Computers Help in Forest Management Planning

A computer program has been prepared that simulates the management of even-aged forest stands. Extensive data collected for Black Hills ponderosa pine are used to illustrate the method. Changes that may be made in the model forest include tree growth, harvest cuts, periodic thinnings, random catastrophic losses, and management objectives. Results are presented as changes in board-foot and cubic-foot volume and money value. Two other computer programs prepare yield tables based on changes in stand diameter resulting from various proposed intensities of thinning.

These three programs enable comparison of

future outcome of numerous silvicultural alternatives—thus providing the knowledge for sound management decisions.

Handbook for Upland Hardwoods

Upland hardwoods in Central States respond best to even-aged silvicultural systems for timber production. Results of many years of research in this hardwood region are summarized in a new handbook for forest managers and landowners. It shows how to regenerate central hardwoods in even-aged stands, and how to perform regular thinnings during the rotation. It suggests ways to improve species composition and timber value.

Shelterbelts Redesigned for Irrigated Farms

Sprinkler irrigation in the Great Plains is a new concept for agricultural production in that vast area. Underground water is being tapped, and extensive new water sources are available from the development of major river basins. Tree shelterbelts are an important adjunct to expansion of farming in the Plains. Recommendations have been developed for the design and the species composition for these new shelterbelts.

For example, in north-central Nebraska, cattle are being confined to feed lots in the summer while corn is grown on irrigated circular quarter-section-sized areas; then the cattle are grazed on corn stubble during the winter months. Circular belts of trees around the irrigated area provide crop protection, reduce evaporation, and aid in uniform water distribution. The non-irrigated triangular areas in the field corners are bordered by trees which protect cattle during the severe winter weather. Christmas trees can be grown in these corners while still serving as winter protection shelters.

FOREST GENETICS RESEARCH

Superior Southern Poplars Being Released

Clonal tests of selected cottonwood trees in the Mississippi Valley confirm that breeding programs for cottonwood will result in significant genetic gains. Growth characteristics of height, diameter, and volume were found to be strongly inherited—as were the wood traits of specific gravity and fiber length. Resistance to melampsora rust was the most strongly inherited trait; thus resistance to this disease should be relatively easy to achieve through breeding. Superior, fast-growing trees selected after testing are being released for establishment of commercial plantations.

Pine Hybrid to Convert California Brushlands to Forests

Large acreages of potential forest sites in California are covered with brush. Many of the sites can produce wood products economically on a short rotation, and all of them are important for esthetics. However, establishment of trees has been difficult and expensive.

The knobcone-Monterey pine hybrid has proven ideal for these sites. Survival and growth have been very good. The hybrids grow much faster than knobcone pine and are more frost-hardy than Monterey pine. The hybrids appear to be particularly useful as an initial tree crop in brush conversion programs, since their rapid juvenile growth keeps them ahead of brush competition.

High-Gum Strains of Slash Pine

The first significant result of Forest Service breeding work in southern pines was the production of a high-gum-yield strain of slash pine. The progeny are now mature for gum production, and four consecutive years of commercial tapping has resulted in yields of 48.7 barrels per thousand improved trees—nearly twice the average yield. Furthermore, the results confirm evaluations made by micro-tapping methods when the progenies were only a few years old.

This confirmation of the micro-tapping technique will speed progeny testing and shorten breeding cycles in the future. Gum yields from "high-gum" strains in seed orchards established by further selection should surpass the superior yields reported here.

Deep-Freeze Storage Safe for White Pine Pollen

Storage of pollen is a continuing problem in tree breeding programs. Recent trials indicate that it is safe to store western white pine pollen as long as 3 to 5 years in a deep freeze—and to use it when fresh pollen is not available. Western white pines with superior traits for timber 110 percent of the seed yield of fresh pollen from the same parents. Pollens stored 4 and 5 years also seemed satisfactory.

This finding will greatly speed efforts to breed white pines with superior traits for timber production.

Pollen Dispersal Model Aids Seed Orchard Planning

Wind disperses pollens of most conifers great distances, horizontally and vertically. This makes it nearly impossible to protect seed orchards from some contamination by outside pollen. Findings of a study supported by PL 480 funds in Finland will be helpful in seed orchard management. Counts of pollen at 1,000 feet above the stands were found just as great as or greater than the counts within the stands.

From this study, a theoretical model of pollen dispersal from natural stands was developed. This model will help people place and manage seed orchards to minimize outside contamination.

FOREST PRODUCTS UTILIZATION RESEARCH

Five more plans for wood houses were developed and made available for people with low to moderate incomes, supplementing the six plans released for use in 1968. . . A convenient and practical manual was issued during the year for use in classrooms to demonstrate wood properties simply and effectively. New log and tree-grading systems were put into use; computers were successfully employed with great speed and accuracy to grade hardwood lumber. . . A new weather-resistant finish for wood was developed. Inexpensive ammonia-base liquid fertilizers were found to be as effective as, and much cheaper than, the ammonia salts now commonly used for fire-retardant treatment of wood.

Low-Cost Wood House Manual and Plans

Now available is a new publication especially useful to the small home builder and the do-it-yourself public. Agriculture Handbook No. 364, "Low-Cost Wood Homes for Rural America—Construction Manual," contains over 100 pages of information covering important details on building sound, low-cost wood homes. Latest construction techniques are emphasized and all phases from foundation to final finishing are covered, step by step.

With the 5 new plans released during 1969, a total of 11 plans are now available for wooden houses with from 2 to 5 bedrooms each. These plans have been developed to aid in the national effort to provide suitable housing for people with low to moderate incomes. Eight of these plans, though largely conventional, are designed for minimum cost. They feature modern wood construction principles and efficient use of wood. The remaining three are primarily innovative designs (round, tubular, and hillside duplex), intended to provide maximum utilization of space and livability, while featuring unconventional building techniques and appearance. Numerous experimental features in these innovative plans also provide for most efficient use of wood at minimal cost.

A new 32-page brochure, "Design for Low-Cost Wood Homes," provides brief descriptions of these 11 houses as to construction types, size, floor plan, and materials. The brochure and detailed building plans for the 11 Forest Service designs are available from the Superintendent of Documents, Government Printing Office, Washington, D.C.

Classroom Manual Demonstrates Wood Properties

A new Forest Service manual, "Classroom Demonstrations of Wood Properties," tells school teachers how to conduct simple demonstrations that show how wood behaves. The exercises deal with the more important properties of wood and emphasize how these properties relate to different wood uses. The demonstrations are easy to perform and require little special apparatus. The manual does not provide a full

course of study but is an educational aid in presenting facts about wood, in clarifying misconceptions, and in avoiding misuses of wood.

Hardwood I-Beams Reduce Cost

A study on the design of built-up I-beams incorporating wood flanges glued to a tempered hardboard web has yielded information valuable to architects, engineers, and home builders. Strength tests on prototypes, over a 30-foot span, showed I-beams with hardboard webs to be as strong as comparable wood beams while utilizing about a third less solid wood.

Southern Pine Studs Dried in 24 Hours

Two-by-four studs sawn from steamed southern pine veneer bolts can be dried satisfactorily in 24 hours, instead of the 100 hours normally required. Complete restraint is needed to prevent warping. Drying costs and warpage are both reduced by half. Broad industrial applications are possible if a multideck, roll-feed, continuous dryer is developed. This utilization technique will extend the Nation's wood supply and enable more rapid and efficient production of needed building components.

Veneer Assures Longer Life for Timbers

A method was developed to prevent the splitting and checking that occurs when timbers are dried. Splits and checks reduce load-bearing capacity, detract from appearance, and trap water that may lead to decay. Millions of dollars are lost annually in replacements, and the Nation's timber resources are depleted unnecessarily.

In treating new timbers not yet in place, a single sheet of veneer with its grain at right angles to that of the timber is bonded to the upper surface of the timber with a waterproof glue. Split timbers already in place can be repaired by using the same technique after the splits are filled by a special preservative paste.

Working Up Hardwood Lumber Before Kiln Drying Found Best

Traditionally, green lumber is kiln-dried directly after rough sawing, but before machine surfacing. Recent new studies show it is more economical to surface the green lumber, cut it to length, grade it, and remove defects—all before kiln drying. Savings result from shorter drying times, less degrade (checking, splitting, warping), more efficient use of kiln space, and opportunities for automatic stacking and handling. The techniques, developed for drying red oak and beech, may apply to other commercially important hardwoods.

New Grading Systems for Six Species

Nine new log-grading or tree-grading systems were approved during the year by the Forest Service. Species involved are Sitka spruce, Englemann spruce, inland Douglas-fir, red pine, eastern white pine, and eastern hardwoods. Although these systems were designed especially to serve high-priority needs of the Federal timber sale program, they will serve important commercial needs as well.

Grading Lumber by Computer—Fast, Highly Accurate

Computers have successfully graded hardwood lumber more accurately and much faster than visual methods. The standard hardwood grading rules were interpreted mathematically and programed for the computer, as were the descriptions of the board characteristics. Scanning devices now being researched will permit reading flitch defects directly into a computer—which would control the sawing, edging, ripping, and trimming operations. Potential value gains are estimated to exceed computer service costs substantially.

Liquid Ammonia Fertilizers—Economical Fire Retardants

Tests on inexpensive ammonia-base liquid fertilizers show them to be effective fire retardants for wood. When used in place of the ammonia salts now commonly employed, savings of 30 to 40 percent in chemical and treatment costs can be realized. Economical, improved fire-retardant treatments for wood in building construction enhance safety and reduce replacement requirements.

New Protective Finish for Weather-Exposed Wood

Better protection against weathering results

from a new waterbase finishing system for wood, made from mixed chromate salts. It combats micro-organisms and screens out ultraviolet light; it is also inexpensive, easily applied, and long-lasting. This penetrating-type natural finish will probably find widest use on farm buildings, fences, summer cottages, and other structures where rough or low-grade lumber and plywood are commonly used. Special coatings can be applied on smooth surfaces to give a varnish-like appearance.

Utilization of Southern Pine Reviewed

The current body of information applicable to southern pine utilization was thoroughly reviewed in a symposium, "Utilization of Southern Pines." The entire field of southern pine wood technology was brought up to date and consolidated in the program to familiarize conferees with wood and bark as an industrial raw material, as well as with conversion processes and major products. All ten species of southern pines were considered.

Soils Affect Richness of Wood Color

Wood color differences between individual black walnut trees, as measured by a spectrophotometer, were found to be related to geographic location and were associated with soil properties. These findings suggest the possibility of controlling wood color of highly valued species, such as walnut and cherry, by varying soil properties.

Kraft "Green Liquor" Preserves Pulp Chips

Pulpwood chips, stored in outside piles, are subject to serious losses of wood substance due to fungal attack and spontaneous combustion. Laboratory-scale studies have demonstrated that "green liquor" chemicals recovered from the kraft pulping process, when applied to fresh pulpwood chips, effectively prevent such losses. These results suggest that kraft green liquor can serve as an economical fungicide and an enzyme inhibitor in commercial applications. Full-scale tests under commercial conditions are underway.

19 New Chemicals Found in Jack Pine Bark

More than 100 chemical compounds have now been isolated from bark of jack pine and fully identified. They include fats, waxes, resins, and sterols. Nineteen of the chemicals found are natural products that have not been previously reported. This completes a comprehensive study of pine bark chemistry which provides a broader technical basis for evaluating the feasibility of bark chemical utilization. The study will contribute to a better understanding of the disease and insect resistance, chemistry, and biosynthetic processes of wood and other natural products.

FOREST ENGINEERING RESEARCH

An "explosion" in use of skyline logging; systems studies to capture logging residues for use; mechanized methods for thinning pulpwood stands; and more stable roads in erosive areas are some results from forest engineering research.

Symposium Forecasts "Explosion" in Skylining

A skyline logging symposium at Corvallis, Oregon, was conducted in cooperation with Oregon State University and University of Washington. Over 500 loggers, land managers, equipment manufacturers, forestry consultants, and research people attended the three-day session. Skyline logging was shown to be an explosive technology with prospects of great impacts on land management, as well as on training needs for engineers and foresters.

Better Roads on Steep Sensitive Slopes

Our engineers investigated forest road failures in the deeply dissected, steep erosive drainages at Zena Creek on the Payette National Forest in Idaho. Excessive structural failures of cut and fill slopes have done extensive damage to the watersheds and stream channels. New design approaches should result in more stable roads for this area of the Idaho Batholith and

for similar areas throughout the Rocky Mountain area.

Industry to Cooperate on Whole-Tree Utilization

Processes to permit separation and segregation of bark and chips prior to pulping are vital to obtain increased pulp and fiber yields from existing stands and logging residues. Industry leaders endorsed a Forest Service plan, and a cooperative effort to speed research in this critical area was agreed on.

Mechanized Thinning of Southern Pulpwood Promising

A study of mechanized pulpwood harvesting indicates that efficiencies approaching those realized in clearcutting operations can be obtained in making thinning harvests. The key is use of a marking system which considers machine configuration. This information opens new possibilities for overcoming critical labor shortage problems in pulpwood harvesting in the South, and for increasing supplies of timber from thinnings.

FOREST ECONOMICS AND MARKETING RESEARCH

Hardwood Timber Supply Situation Improving

New data on trends in timber inventories, current growth, and removals indicate that in terms of volume, the hardwood timber situation in the United States is improving for most species and most hardwood-producing regions. Sawtimber inventories increased 5 percent between 1962 and 1967 and 14 percent between 1953 and 1968. Net annual growth of sawtimber trees totaled 17.5 billion board feet in 1967—about 31 percent more than removals of 13.4 billion board feet.

However, these aggregate figures on growth and removals do not indicate the problems of size and quality of the timber and tend to overstate the commercially usable volumes available. Nevertheless, U.S. hardwood forests could maintain an increase in log harvests. After some years, however, projected demands for hardwood lumber, veneer, and plywood are likely to exceed projected supplies. It may then be necessary to us more of the tropical hardwood forests of Asia and other areas for high-quality hardwood products.

Softwood Lumber Prices Fluctuate Widely

Between January 1968 and March 1969, wholesale softwood lumber prices rose from an index level of 113.7 to 170.6 (1957-59=100). Between March and August, prices declined sharply in 128.6—and changed little during the rest of the year. The rise and fall of softwood plywood prices was even more dramatic.

This recent price situation may be attributed to a number of factors. A rise in residential construction and in output of containers and furniture in 1968, plus rising exports, resulted in substantial increases in demand for most species and grades of softwood lumber and softwood plywood.

These expanding markets were not fully supplied in spite of a rise in both domestic production and imports—because of limited plant capacity or timber resources in some areas; shortages of labor, logs, and freight cars; and adverse weather. Expectations of a major increase in housing construction in future years, and increasing evidence of a tightening timber supply situation, also contributed to the price rise.

Forests in Black Hills Can Support Veneer Industry

Black Hills forests can produce softwood veneer of sufficient volume and quality for at least C-D grade construction plywood. Surveys showed that nearly 77 percent of the volume in sawtimber and poletimber stands on the Black Hills National Forest would be suitable for veneer. Estimates indicate that modest profits could be realized from plywood production in this area.

Factors Affecting Hardwood Veneer Mill Location

A case study of the decision-making process in selecting a community for the location of a multi-million-dollar hardwood veneer mill

showed that four major factors dominated the decision:

1. Location and characteristics of major markets for veneer.

2. Transportation facilities and costs of obtaining raw materials and shipping veneer to market.

3. Availability and cost of financial assistance.

4. Management preferences with regard to physical, social, and economic environment of competing communities.

Linear Program Developed for Estimating Softwood Plywood Growth

A linear program for estimating potential softwood plywood production indicates that a third of the Nation's plywood capacity could be located in the South by 1975. The analysis is based on the relative costs of logging and manufacturing plywood and lumber in the major forest areas, and costs of transporting these products to the Nation's markets.

Forest Surveys of 47 Million Acres in 11 States

During the past year, the equivalent of 47 million acres of commercial forest land was inventoried. Field surveys were conducted in Alaska, Arkansas, California, Florida, Maine, Nevada, New York, Oregon, South Carolina, Washington, and Wisconsin. Reports appraising the forest situation were issued for 8 States or portions of States. Resurveys in the different States, now being made at intervals of 10 to 15 years, indicate many changes in timber growth and harvests.

FOREST RECREATION AND RELATED HUMAN ENVIRONMENT RESEARCH

Researchers in forest recreation find that urban visitors need to be educated in the care and use of the natural environment if rapidly increasing vandalism of outdoor recreation facilities is to be halted. They are also: Seeking more meaningful language to describe the landscape, taking an inventory of wilderness plant and animal communities, determining campsite preferences, and finding out how to tell "heavy" from "light" use campers.

To reflect this broader range of studies, the Forest Recreation Research Branch was renamed the Forest Recreation and Related Human Environment Research Branch.

First Step to Maintain Wilderness

A thorough ecological understanding of the resources concerned is needed to maintain wilderness plant and animal communities, and to restore disturbed areas. Such a study is underway in the northwoods forest types of the Boundary Waters Canoe Area. Nine plan communities have been described and their important plant members listed.

Clearer Terms to Describe the Landscape

Not all people mean or see the same thing when they discuss or observe landscapes. To aid clearer communication, terminology for recording and describing the landscape was developed in a California study. The landscape was considered as a visual, physical entity and not as a state of mind or abstract emotional quality. Six factors of scenic analysis and observation were described.

Man can do little to alter three of the factors —**form, spatial definition,** and **light.** However, the manipulation of the other three factors—**distance, observer position,** and **sequence**—can create profound impacts upon the observed landscape.

Outdoor Law and Order—'Get Involved'

Campgrounds throughout the country are experiencing serious theft, vandalism, rule violation, and even more serious crimes. A research team studying depreciative behavior in northwestern National Forests, National Parks, and State Parks is finding that many visitors have indifferent, inconsiderate and irresponsible attitudes. The researchers point out that visitors must assume more responsibility for protecting their own property and that of their neighbors, and the public. Administrators of recreation sites must recognize that the urban-oriented population needs more education in the care

and use of the natural environment. Camping and outdoor recreation is a social experience, and the explanation of policies and rules through proper training of environmental managers must be given an emphasis equal to that of preserving the environment.

Evaluating Campsite Preferences

An analysis of use preferences of campers in 24 Adirondack campgrounds showed that nine out of 40 campsite characteristics were ranked as important on lake-based sites. Among the nine were: Area of lake upon which a campground was located, areas of other accessible lakes, land area of developed swimming beach, percent of campsites from which the lake is visible, average distance of campsites to edge of lake, permanent population within a 25-mile radius, and total number of campsites.

Campground Owners Should Seek 'Heavy' Campers

Most volume purchasing of commodities is done by a fraction of the people comprising the total potential market. A New England study indicates that the same pattern prevails in camping. Half the campers did three-fourths of the camping and each averaged 34 days of campground use—three times as much as the "light-half"—and spent three times as much money. These "heavy-half" campers have large investments in equipment.

Campground owners may improve their business if they: (1) Send extra mailings to those who camp more than 20 days; (2) advertise through equipment dealers and at equipment shows, and (3) advertise in camping magazines which have a large portion of heavy-use campers among their subscribers (as determined by readership surveys).

Computers Can Make Visibility Maps

For years, mapmakers and land resource managers have been making overlay-visibility maps to delineate areas which can be seen from a fire lookout, a mountaintop, or a scenic highway. These maps have been made by hand-sketching profiles from a contour map. Now this can be done with a computer program developed by our scientists in California. Input consists of data on elevations, by coordinates, which can be obtained rapidly from maps or aerial photos. The computer produces a map overlay that shows the areas visible from any observation point.

It's Better to Stake Trees Low

Breakage or severe deformation of the tops of young, planted trees which have been staked is often a serious problem. An analysis in California proved that stresses vary greatly from ground level to the top of the tree, and that effective staking is accomplished by reducing, not increasing the height of staking.

FOREST INSECT RESEARCH

Integrated Control of the Gypsy Moth

Detailed studies of the population dynamics of the gypsy moth in a variety of forest conditions have provided a sound ecological basis for an integrated approach to control of this pest. The moth is affected by microclimatic conditions in the forest, and it is vulnerable to many natural control agents. These can be manipulated and utilized in different combinations and sequences to halt its spread and hold down its numbers. The diversity of ecological conditions and forest resource values call for a flexible, integrated approach.

Better, Safer Aerial Spraying

A new research work unit at Corvallis, Oregon, is developing safer and more efficient means of applying biological and chemical agents for forest insect control—primarily viruses and chemicals with highly selective action, nontoxic to other forms of life. For example—

—A quickly attachable helicopter spraying system for ultralow volume application of microbial insecticides was developed in cooperation with engineers at the Missoula Equipment Development Center. Application rates can be changed, even while in flight, from 0.5 to 0.1

gallon per acre. Droplet size is controlled by the spinning rate of atomizing devices. The effectiveness of this system was demonstrated in field tests with a water-base formulation of the polyhedrosis virus of the Douglas-fir tussock moth.

Mass Purification of Viruses

The Forest Service has developed a highly efficient technique for mass purification of virus polyhedra from infected larvae of the Douglas-fir tussock moth, European pine sawfly, gypsy moth, and other insects susceptible to this type of disease-causing virus.

A joint effort with the MAN ultricentrifuge unit at the Oak Ridge National Laboratory has produced very concentrated, purified polyhedral preparations in quantities adequate for direct control use. Further work is aimed at automation of the process.

Beetle Attractants and Repellents

A field procedure has been developed by a team of Forest Service and University of California entomologists for delivering and assaying natural and synthetic attractants of the western pine beetle. Combinations of the female-produced attractant (exobrevicomin), a hose constituent (myrcene), and other compounds were shown to be very effective in field-trapping tests during 1969. . . This technique will permit detection and assessment of western pine beetle populations before appearance of dead trees, thus facilitating preventive action.

Two chemicals have been isolated from elm twigs and identified as feeding stimulants of the smaller European elm bark beetle, the primary vector of the Dutch elm disease. This work, a cooperative effort of scientists at our Forest Insect and Disease Laboratory in Delaware, Ohio, and chemists at Ohio State University, confirms and extends prior findings of researchers at the University of Wisconsin. . . Investigation is now underway to find chemical antagonists to these stimulants, so that feeding (and thus inoculation of healthy trees with the fungus) can be prevented.

The pales weevil, a serious pest of pine reproduction throughout the East, is stimulated to feed on host seedlings by lipid fractions of the phloem tissue. Sugars have been shown to increase feeding significantly, while triphenyl-tin acetate inhibits it. . . The use of such deterrents or repellents in place of seedling dips in aldrin, BHC, and other persistent insecticides will allow safer handling of seedlings and give adequate protection without hazard to wildlife.

Bark Beetle Damage Survey by Air in Color

Large-scale color aerial photographs (1:8000) and a stratified two-stage probability sampling design were used to estimate timber losses caused by the Douglas-fir beetle in California. Compared with current standard methods, this procedure provided more accurate estimates and required less time and cost.

FOREST DISEASE RESEARCH

New Antibiotics Discovered

Certain fungi which grow in close association with the roots of southern pines were found to produce powerful antibiotics. This action may protect tree roots from diseases. The same antibiotics also inhibit a wide variety of harmful fungi and suggest a new source of antibiotics potentially useful in both agriculture and medicine.

Aerial Survey of Air Pollution Injury

A Forest Service research team successfully tested a new remote sensing technique for appraising extensive air pollution damage to forests. Using large-scale aerial color photography, special filters, and sampling systems, the team detected injury on an average of 13 ponderosa and Jeffrey pines per acre throughout 161,000 acres in the San Bernardino Mountains, 60 miles east of Los Angeles. Trees were rated as to severity of injury: 82 percent moderate, 15 percent severe, and 3 percent dead. The survey cost only 3 cents per acre.

Air pollution injury was shown to predispose ponderosa pine to bark beetle infestations. As severity of air pollution injury increases, the amount of infestation also increases. This is

doubly serious since bark beetles building up on injured trees then are able to kill adjacent healthy trees.

Needle Cast Controlled in Red, Scotch Pine

A serious foliage disease, later identified as *Lophodermium* needle cast, caused the loss of millions of red and Scotch pine seedlings in Lake States nurseries from 1966 through 1968. Even before the fungus causing the disease was definitely known, research on control was started. In 1969, our scientists perfected a fungicidal spray method which gives excellent control and practically eliminated losses from this disease.

Better Forecasting for Fusiform Rust Infections

In the Gulf States, weather favoring infection of pine nursery seedlings by fusiform rust is produced by high-pressure systems off the Southeast coast. It is now possible to predict weather conditions favorable to rust infections 5 days in advance. By confining control efforts to these high-risk periods, rust losses in pine nurseries are minimized and pesticide hazard and cost reduced.

FOREST FIRE AND ATMOSPHERIC RESEARCH

The scope of the Division of Forest Fire Research was expanded to include fire, forest, and mountain meteorology, weather modification, and cooperative programs in these fields with other agencies. The Division was renamed Forest Fire and Atmospheric Sciences Research, and another meteorologist was added to the staff.

A spectacular reduction in lightning-caused fires and a better way to detect lightning and tiny fires and to map big fires were all shown to be practical. Fire behavior research is also helping to prevent future disaster fires.

Lightning Fires Can Be Prevented

In several pioneering experiments, Project Skyfire at the Northern Fire Laboratory in Missoula, Montana, has shown that nearly 70 percent less cloud-to-ground lightning occurs from storms properly seeded with silver iodide. In 26 storms, an average of 19 cloud-to-ground strikes occurred from seeded clouds as compared to 58 strikes from untreated clouds. Moreover, seeded storms had a shorter life, and the duration of current flow of lightning discharges was reduced. Statistical tests of data from the 26 storms show a highly significant reduction of the type of long-lasting lightning storms most likely to ignite forest fires.

These results now provide a strong scientific foundation for developing and testing an operational system to prevent lightning fires. This new opportunity is of tremendous significance, because lightning: (1) causes two-thirds of the fires on Federally-protected forests, (2) accounts for half of the fire loss to commercial timber, (3) is the critical factor in recent fire disasters in the West and Alaska, and (4) costs $100 million a year for fire control.

Six top Russian meteorologists visited the lab in 1969 to review this research.

Electronic Storm and Fire Detection

In a cooperative program with the Bureau of Land Management, a lightning sensing system developed by fire research personnel was installed in a high-flying jet aircraft used for fire patrol operations. Successful tests were made in Alaska of the system's ability to detect lightning. This new technology provides a fast effective means of mapping lightning zones over vast forest areas and will speed up fire detection and fire attack operations.

We started using in 1969 a new propjet aircraft equipped with a Forest Service-developed multispectral electronic system for detecting tiny fires, mapping big ones, and providing data on forest resources. Besides advancing development of an efficient wildfire intelligence system, we are using this new scientific facility in cooperative studies with the National Aeronautical and Space Administration (NASA) to test detection of heat sources, as required in space program operations.

Protected Environmental Quality

We accelerated development of methods to protect air quality. Field tests were performed on new techniques to reduce smoke pollution from burning of logging slash and from prescribed fires. Cooperative studies with several universities and the Department of Health, Education and Welfare (HEW) are investigating the nature and amount of substances emitted to the atmosphere by wildfires. From these studies we will develop systems for treating forest fuels to protect air quality. Smoke accumulation in the lower atmosphere will be prevented or minimized by evaluating atmospheric conditions before setting off prescribed fires and by improving techniques for using prescribed fires.

Fire Disaster Research

Advances in forest fire behavior research are helping to prevent future wildfire disasters. The development of improved methods and systems for both prediction and control of fires that burn under critical conditions of weather and fuel flammability depends on the results of this research. Recent forest fire disasters in Alaska, southern California, and the Pacific Northwest serve to reemphasize this point. A detailed report was published on fire behavior in the 1967 Sundance holocaust in northern Idaho.

From wind tunnel and combustion laboratory experiments, we have developed a mathematical model of fire-spread according to fuel and weather variations. Field experiments on mass fires are providing a better understanding of convection column activity, rates of combustion, and violent fire behavior. In 1969 we advanced further in this research by participating in a mass fire experiment in Australia that tested fire behavior factors on an advancing large-scale flame front.

Fire behavior findings were tested under the critical conditions of several violent wildfires in 1969. These operations included field measurements of massive fires that burned some five million acres in Alaska, and a detailed study of the Canyon fire-flood tragedy in California that caused nearly $100 million in damages and the loss of more than 50 lives. In cooperation with the Department of Defense, we began operation of a data bank of fire characteristics, continued assistance in overseas fire defense research, and started test operations with a network of automatic weather stations.

RANGE AND WILDLIFE HABITAT RESEARCH

In range and wildlife habitat research, programs emphasize fuller understanding of the ecosystem in the production of all products and services. To reflect concern with the overall environment, the Range and Wildlife Habitat Research Branch was renamed the Range and Wildlife Habitat Ecology and Management Research Branch.

RANGE RESEARCH

A special committee recently completed a report which is pending publication: "Range Ecosystem Research—The Challenge of Change." This report stresses the values of the range in addition to the traditional role for livestock production, and proposes research of a much broader scope. These examples that follow reflect emphasis of recent research in livestock production on rangelands.

Cattle Gain Well on Cheatgrass

A 3-year study showed that yearling cattle can gain as well on Idaho's cheatgrass ranges as on crested wheatgrass range. Gains averaged 1.43 lb. per head per day over a 7-month grazing season. Rotation and continuous grazing produced similar daily gains, but carrying capacity was reduced by the rotation system's lack of synchronism with the growth cycle. Grazing capacity and beef production increased under continuous heavy grazing, but possible adverse vegetation changes make heavy grazing undesirable.

Spring Deferment Improves Semidesert Ranges

On our Santa Rita Experimental Range in Arizona, the density of perennial grasses tripled under spring deferment—suggesting that grazing in the March-June period is more critical than summer or winter grazing. If the results of these small-plot studies are confirmed by further research, spring deferment may be the key to improving extensive areas of semidesert range.

Sagebrush Reinvades Semiarid Ranges

On semiarid livestock ranges in Wyoming, we found the initial benefits of sagebrush spraying began to decrease within 5 years after spraying. Within 14 years they were nullified. Even when protected from grazing, the increase in herbage production was nullified within 6 years after spraying. Sagebrush reached its original density within 14 to 17 years, and became even denser after 17 years.

Sagebrush Controlled in Mountain Ranges

A different situation prevails on mountain ranges supporting an understory of perennial grasses. There, moderate grazing may continue after sagebrush control without retarding the revegetation process or hastening the reinvasion of sagebrush. By omitting a period of grazing deferment, returns on the investment in sagebrush control are maximized.

Rotation Grazing Best for Crested Wheatgrass

Crested wheatgrass used for spring grazing in the Intermountain Region should be managed under a rotation system—utilizing about 65 percent of the herbage produced, studies have shown. This procedure allows maximum livestock gains per acre and maintains the forage resource. At the same time it permits some fall grazing, particularly in pastures grazed during the first part of the spring season.

WILDLIFE HABITAT ECOLOGY

Research programs now include studies of the habitats of songbirds, endangered species, and other nongame wildlife. Data were reported on how best to combine livestock and game use on ranges, and how to increase forage production for game in forests.

Livestock Affect Elk Use in Oregon

Elk use decreased as cattle stocking increased on Oregon ranges; however, rate of cattle stocking had little effect on deer use. Deer preferred ranges that were grazed by cattle only part of the year somewhat more than ranges grazed season-long. But neither grazing system had much effect on use of ranges by elk. Conservative cattle stocking gave good overall production from multiple-use ranges.

Prairie Chicken-Grouse Review

The publication, "Characteristics and Habitat Requirements of the Greater Prairie Chicken and Sharp-tailed Grouse—A Review of the Literature," was issued in 1969 as USDA Conservation Research Report No. 12. It reviews and summarizes 329 references on these two species. The review enables careful planning of new research to provide needed information and avoid duplication of previous research.

Clearcutting in Strips Increases Deer Use

Clearcutting a Colorado lodgepole pine and spruce-fir forest in narrow strips 1 to 6 chains wide, with alternating uncut strips of the same widths, doubled the use by mule deer 10 years after logging. The increased use was in the clearcut strips.

Thinning Aspen Groves for Game Use

Thinning aspen groves in Arizona resulted in large increases in forage production. But the fallen trees in the thinned groves prevented deer, elk, and cattle from effectively eating the more abundant forage.

Natural aspen groves are important habitat for elk and deer—producing six times the forage of mixed conifer forests. Aspen groves interspersed in mixed conifer forest should effectively improve habitat for deer.

Increasing emphasis is being given to studies of Man's activities that degrade watershed environments. Projects include the evaluation of effects of pesticides on water quality, control of water pollution from sedimentation, and determination of management systems necessary for obtaining optimum fish habitat. To reflect this broader concept, the Forest Soil and Water Research Branch was renamed Watershed and Aquatic Habitat Research Branch.

Rime Ice as a Source of Water

Rime ice and hoar frost precipitated from trees at high altitudes in winter may contribute as much as 3 to 4 inches of water for downstream use. Forest Service scientist studied this phenomenon on the eastern slopes of the Cascade Range in Washington, where fog is a common weather phenomenon. Time-lapse photographs recorded the formation of ice on trees and other objects in the airstream. These studies showed that rime ice formed in one day can amount to from 1,300 to 1,600 gallons of water per acre in moderately dense lodgepole pine. This totals about 80,000 to 100,000 gallons throughout the winter season. Properly located tree plantings and artificial devices could collect rime ice to increase downstream water supplies.

Herbicide Stream Pollution Depends on Season of Use

The finding that properly scheduled use of herbicides can reduce brush competition without causing serious water pollution should interest timber managers seeking to improve tree growth. Runoff of 2,4–D and 2,4,5–T can occur after the first heavy rainfalls in coastal Oregon and Washington, if the forest is sprayed in mid- or late summer. Scientists learned that the greatest danger occurs when heavy rains following spraying cause the herbicide material to be washed into streams. However, streamwater samples from areas sprayed in spring or early summer showed little or no contamination.

Some Herbicides Quickly Become Benign

Decomposition of herbicides deposited on the forest floor is relatively fast. Amitrole and 2,4–D are lost most rapidly; none was recovered 35 days following application. The other phenoxy herbicide, 2,4,5–T, is intermediate in persistance; it was detected up to 120 days after application. Picloram, a powerful and persistent herbicide, had an estimated half-life of almost 9 months. Selection of a rapidly degrading herbicide is essential where there is danger of the chemical being washed into streams by rains shortly after application.

New Ski Slopes Require Fertilizer

A starter fertilizer is needed to establish, and in some cases to maintain, erosion-controlling ground cover on ski slopes. Crested wheatgrass did not survive without fertilization when tested on newly developed ski slopes near Wenatchee, Wash. Seedlings emerged but did not develop once the seed energy had been exhausted. However, the same soil, treated with fertilizer to offset its chemical deficiencies, produced up to 1.7 tons per acre of oven-dry grass—enough to protect soil under any conditions.

Engineering New Watercourses

Conversion of gullies to grassed waterways dramatically reduced soil loss on mountain slopes in Colorado. Three years after treatment the four converted gullies tested by researchers lost only 9 percent as much soil as comparable untreated gullies. Treatment consisted of sloping steep banks, installing check dams and seeding with grass. Keys to success were careful engineering survey and design, close supervision of construction, and good response to revegetation measures.

INTERNATIONAL FORESTRY

International forestry activities during the year included the session on tree breeding held in Washington, D.C.; meetings to plan the 15th Forestry Research Congress, to be held in Florida in 1971; the U.S.-Japan forestry panel; various United Nations Food and Agriculture Organization sessions, and many related meetings around the world. Academic or field training programs or study tours were prepared for 195 visitors from 44 countries.

World's Tree Breeders Meet

The United States hosted the 2nd World Consultation on Forest Tree Breeding, in collaboration with the Food and Agriculture Organization of the U.N. and the International Union of Forestry Research Organizations, in Washington, D.C., in August. More than 200 scientists from 42 countries and six international organizations participated. Advances since the first Consultation in 1963 was summarized, and the practical advantages of tree breeding were assessed. FAO conducted a Forest Tree Improvement Training Center for 15 foreign scientists at North Carolina State University in July 1969.

International Forestry Research Organizations

The permanent and enlarged committee of the International Union of Forestry Research Organizations (IUFRO) met from Aug. 26 to Sept. 8 in Oslo, Norway, to consider reports of research accomplishment and to plan Union affairs. The technical work of IUFRO is done through sections, one for each subject matter, and working groups of scientists. The Forest Service has membership on many of these.

The organizing committee for the XV IUFRO Congress, to be held at the University of Florida, March 15–20, 1971, held two meetings in Washington, D.C. to arrange for the Congress and technical field study tours. The Congress meets about every five years; the International Council reviews progress and determines direction for the next period.

The Forest Service is actively supporting the Congress because of its interest in IUFRO affairs and the benefits gained from the exchange of information. The former Deputy Chief for Research is the current president of IUFRO.

U.S.–Japan Resources Panel

The Forest Service and the Bureau of Land Management, Department of the Interior, represented the United States in Tokyo, Aug. 27-Sept. 5, for the first joint meeting of the Panel on Forestry of the U.S.–Japan Cooperative Program on Natural Resources (UJNR).

Panel members discussed the general topic of reforestation and specific categories, such as exchange of plant materials, performance of introduced trees, forest ecosystems and nutrient cycling, new tree breeding and propagating techniques, shortening the period for determining genetic differences, and special seeding and planting techniques.

Food and Agricultural Organization

The Forest Service participated in the work of the technical committees on Forestry of FAO. The Chief represented the U.S. in reviewing and advising on the program of work and budget in forestry (including tropical forestry) for 1970 and 1971. Priority problems selected were: Tree improvement, cost studies of forestry operations including non-wood benefits, and utilization and marketing of tropical woods.

At the 15th session of the FAO Conference (governing body) in November, the Forestry and Forest Industries Division was elevated to Departmental status. The new Forestry Department, with two divisions—Forest Resources, and Forest Industries and Trade—is headed by an Assistant Director-General.

Six regional forestry commissions advise the Director-General on FAO forestry work. We participated in the regular meetings of two of these in 1969—the Asia-Pacific and the North American. The 8th session of FAO's Asia-Pacific Forestry Commission was held in Korea, May 1–8. Discussions centered on industrial development, although many delegations stressed the need for a balanced approach to give equal value to all aspects of forest development and watershed management. The 5th session of the FAO-North American Forestry Commission met in Ottawa, Canada, Sept. 15–20. Reports

were received on forest fire control, forest insects and diseases, wildlife and outdoor recreation, and forest tree improvement. An informal study group on forest engineering was continued.

Other Conferences

We also participated in these 15 international conferences on:

Natural products from chemistry, Mexico City; PPB, Federal Republic of Germany; wood protection, Cambridge and London; terrain-vehicle systems, Essen; agriculture aviation, Kingston, Ont.; botany, Seattle; thinning and mechanization, Stockholm; game biology, Moscow; rope transport, Lucerne; control of trade in reproductive materials, Paris; clear air, Düsseldorf; snow and ice, Calgary; remote sensing of land resources, Paris; logging (Pacific Logging Congress), Vancouver, B.C.; and wood in housing, Vienna.

Translation Services

Translations were made of some 850 pages of foreign language scientific and technical publications, of primary interest to forestry. The translations were processed and made available under the Special Foreign Currency Science Information Program.

Translation of 360 pages was done by the Joint Publications Research Service, Department of Commerce. The Department of State translated about 450 pages.

Union of Societies of Foresters

The Forest Service assisted in the operation of the organizing Congress for the International Union of Societies of Foresters, held in Washington, D.C., August 18–19. Thirty-four foresters representing 17 countries and international organizations attended the session. The Congress' objective was to organize the professional forestry societies of several countries into an international union in order to advance forestry, conserve natural resources, and promote world-wide professionalism in forestry.

Training Foreign Nationals

We played an important role in training 195 visitors from 44 countries in forestry and related resources. During the year, 114 programs or study tours were prepared covering academic or field training for these foreign nationals.

Sixty of these visitors were sponsored by the Agency for International Development (AID) and 23 by FAO. The remaining 112 were either self-sponsored or sponsored by their employers and governments, international foundations, or by Department of State through its educational and cultural exchange programs.

Of the countries represented, 79 visitors were from Asia, the Middle East, the Pacific Islands, and Australia. Thirty-one came from Europe, 30 from Africa, and 15 from Latin America.

Interests of the participants covered a wide variety of subjects. At least a third were trained in general forestry. Other fields covered were forest administration, logging, utilization and marketing, range and watershed management, timber management, forest economics, forest protection, forest recreation, forest inventory, genetics and tree improvement, forest statistics, and forestry education and research.

Thirty-five visitors were scheduled for enrollment in forestry studies at American colleges and universities. A total of 56 are now enrolled under such Forest Service programming. Supplementary summer field training on National Forests, at Forest and Range Experiment Stations, and on other forestry and related projects throughout the United States was provided for many of those enrolled.

Overall, international visitors spent a total of 2,800 man-days with the Forest Service and received 1,580 man-days assistance from field personnel.

World Forestry Resources

In addition to completing nine special reports for a contracting agency, we provided information regarding forest resources and forest products industries in foreign countries. This material was sent in response to more than 200 requests from other Forest Service divisions, other Government agencies, industry, educational institutions, and private individuals.

Technical Support

During 1969, 29 Forest Service personnel served AID and FAO in 22 countries, on assign-

ments of one year or longer. Six persons were recruited for new assignments and sent to foreign posts during the year. Seven assignments were completed and the incumbents returned to Forest Service employment. The remaining 22 continued their service in foreign posts through 1969. Recruitment for three new assignments was initiated.

Short-term assignments of less than one year involved 12 Forest Service experts serving in 7 countries. These experts provided technical consultation in forest management, silviculture, fire control, forest utilization, economics, and entomology. Recruitment for two short-term assignments was initiated.

During 1969, 8 Forest Service men were assigned under Participating Agency Service Agreements (PASA) with AID: 3 in Vietnam, 2 in Kenya, 1 each in Laos, Paraguay, and the Dominican Republic. One man each from Vietnam, Paraguay, and the Dominican Republic completed his assignment and returned to the Forest Service. Training was completed for 3 men, 1 for Vietnam and 2 for Kenya.

In addition to those requests concerning world forestry resources, about 200 inquiries and requests from foresters and scientists in 50 countries were received and serviced during 1969. These requests were for publications, handbooks, and other technical material, and information on forestry employment and training opportunities, exchanges between scientists, and the involvement of universities and other forestry institutions in international forestry development.

COOPERATION — STATE and PRIVATE FORESTRY

FORESTS COVER ONE-THIRD of the land area in the continental United States. More than 70 percent of the commercial forests are owned by private citizens. The Forest Service cooperates with State agencies, private forest owners, processors, and rural community planners and developers to: (a) Protect 511 million acres of State and privately owned forests and watersheds against fire, insects, and disease; (b) encourage better forest practices for multiple use management and profit on the 395 million acres of private forest land; (c) produce genetically improved forest tree seed; (d) produce planting stock for forests and shelterbelts; (e) stimulate development and management of State, county, and community forests; (f) assist forest products producers and processors in improving quality and quantity of their output; (g) provide the Nation's citizens with an abundant supply of wood, water, wildlife, and outdoor recreation; and (h) provide a better livelihood for rural people.

The Forest Service provides many special services to rural communities to expand local forest and wood-product industries. For example, unemployed citizens of Ojo Caliente, N. Mex., were recently assisted by the Forest Service and other agencies to form a cooperative to produce Spanish-style furniture and wooden toys. We have contracted with this co-op to produce signs for National Forest areas in New Mexico, Arizona, and Texas. Also, Yahtay Industries, a small enterprise in the Jemez Indian Pueblo in Sandoval County, N. Mex., received technical help which enabled it to provide an acceptable finish on wooden blocks. Personnel at the Forest Products Laboratory, the Southwestern Regional Office, and the University of Northern Arizona, cooperated on the problem.

Two million man-hours of work experience and skill upgrading was provided for rural youths and adults during the past year by the Forest Service in several special programs. Participating States provided another two million man-hours of such work.

The phenomenal 1968-1969 season rainfall in the Los Angeles River Flood Prevention Project area (over 30 inches during one 9-day storm) dramatically proved the value of Forest Service flood prevention measures, including intensified fire control. Special emergency flood control treatment is being given to large areas damaged by floods from these storms. Also, we gave emergency treatment to six critical West Coast burned areas totaling over 100,000 acres during fiscal year 1969, to prevent future loss of life and serious damages from flood, erosion, or sediment deposits. Treatments included grass seeding of burned areas, roadsides, firelines, etc.; sediment control and clearing of stream channels; reforestation and brush seeding, and stabilization of gullies.

COOPERATIVE FOREST MANAGEMENT

Rural Development

The Forest Service works with cooperating State Foresters on special efforts to further rural development.

The objective is to provide more and better jobs and more satisfying living conditions in rural areas—so that Americans will have a wider choice of where to live. In the next 10 years an increase in the production of forest products and in the use of forests for recreation will provide rural America with opportunities to take collateral action in developing new economic enterprises.

In fiscal year 1969, Forest Service and State forestry personnel provided some 6,000 assists to rural development groups, community action agencies, and local and district development associations and corporations. This assistance involved planning and development projects covering a wide range of activities, such as:

The Forest Service provided two million man-hours of work experience to rural youths and adults through the Neighborhood Youth Corps, New Careers, Work Study and Work Incentive Programs, Operation Mainstream, and Manpower Development and Training. State Foresters provided an equivalent work experience under the same programs on State and other local public lands. This kind of forestry work offers excellent opportunities for on-the-job training and upgrading of skills in rural areas.

We cooperate with regional, State, multi-county, and other local agencies in resource management, planning, and economic development programs. Foresters actively seek more resource management opportunities for local communities. Wooded land is a replenishable reservoir of timber and other resources needed to supply industry, fish and game, clean water, and outdoor recreation. It provides an unusually broad resource base for the expansion of local economies.

Lesser-known "special forest products" provide rural people with additional income. These products include nuts, berries, seeds, shrubs, decorative materials, and medicinal and chemical products. Arts and crafts associations have been organized in the Appalachian and Ozark Regions to utilize special forest products.

Forest Products Utilization

Capability of Federal and State forest products utilization specialists to provide technical assistance in harvesting, processing, and marketing forest products was strengthened by:

a. Completion of plans for specialized training in business management, scheduled at University of Oregon in February 1970.

b. Initial preparation of a handbook of technical information for FPU personnel.

c. Completion of an intensive training program at the Forest Products Laboratory for an FPU drying specialist. This man was assigned responsibility for planning and conducting annual kiln drying demonstrations for industry personnel and others concerned with properly drying wood with minimum value and volume losses.

Overall strength of the FPU specialist force was increased as additional State Forestry agencies were encouraged to staff for and provide technical assistance to landowners, loggers, and wood products manufacturers in their States. FPU position strength increased about 8 percent; only 12 States do not have these specialist positions.

Measures were taken to upgrade efficient use of wood resources and viability of the wood-based industry. These include:

a. Demonstrations of wood guard-rail post-driving in four regional locations to promote use of wood in highway construction.

b. Development of a National Safety Code for sawmills for improved employee welfare in this major segment of the wood industry.

c. Assistance to State housing authorities, local builders and architects, and State and local groups in developing manuals for housing and construction plans for low-cost wood houses.

On-the-ground assistance was given in utilizing local wood and labor resources to provide housing.

The CFM Program

The Federal-State Cooperative Forest Management Act Program provides the principal

technical assistance available to the more than four million owners of 300 million acres of nonindustrial private forest land in the United States. These holdings, which represent 59 percent of the Nation's total commercial forest, must produce more than half of the Nation's future timber requirements. These holdings must help maintain satisfactory supply-price relationships of forest products needed for construction purposes. They must also make important contributions to the Nation's demands for water, wildlife, forage, and recreation.

Program benefits are: (1) a better income and living for the owners and users of these lands and for residents of nearby communities; (2) a stable resource base for forest industries; and (3) a healthy and pleasant natural environment.

Forest owners are helped to improve the management and productivity of their lands and the harvesting and marketing of their forest products. Loggers and wood processors are assisted in improving their equipment and methods, and in expanding their markets. Individuals and communities profit from the improved condition and utilization of the forest resources.

The Federal Government and the States cooperate in carrying out the program. In fiscal year 1969 the Federal share in financing the program was $3.66 million and the States' share was $6.36 million.

During the year, 828 service foresters employed in this program by the 49 cooperating States, Puerto Rico, and the Virgin Islands helped 115,000 forest owners. The area covered was 7.34 million acres or 2.4 percent of the Nation's acreage of private, nonindustrial forests. This assistance provided a gross return of $31.88 million to the owners of these lands from the forest products harvested.

Tree Planting: Better Stock

Under the Cooperative Forest Tree Seedling Production, Procurement, and Distribution Program for establishing forest and shelterbelt plantings on State and privately-owned lands, 1.12 million acres were planted during the 1968–69 planting season. Over 77,000 acres were planted on State-owned forest lands; the remaining acreage was in private holdings (see tables 10 and 11 in appendix).

The forest products industries operated 26 nurseries in which over 114.7 million trees were grown. This planting stock reforested over 191,000 acres; however, the planting needs of the forest industry exceeded this supply, resulting in the purchase of about 294 million seedlings from State nurseries and other sources.

Forty-six States, plus Puerto Rico and the Virgin Islands, participate in this program. Eighty-six State-owned and operated nurseries produced nearly 580 million seedlings and transplants that were subsequently planted on more than 966,000 acres. Well over 100 smaller commercial forest tree nurseries produced planting stock used primarily for Christmas tree plantings and for shelterbelts.

Once again, 10 States produced over 400 million trees, which accounted for about half (49 percent) of the total forest tree planting stock.

Obtaining adequate nursery labor is a national problem. To help solve it, the Equipment and Development Center at Missoula, Mont., is developing a tree seedling harvester. The pilot model has been tested in several western nurseries. Plans call for an operational model to be ready for the 1971 lifting season.

An increasing quantity of genetically-improved tree planting stock is available with each new planting season. Georgia produced in excess of 16 million genetically-improved slash and loblolly pine seedlings for planting during the 1968–69 season, compared to four million in 1967–68. North Carolina custom-grew six million seedlings from industrial seed orchards. All 13 Southeastern Area States have underway cooperative State tree improvement projects of some magnitude, while 14 of the 20 Northeastern Area States have programs underway or planned.

Georgia produced over 28 million improved-quality slash and loblolly pine seedlings, half the State's total production of some 55.9 million seedlings. Georgia leads the Nation in total seedling production.

Thirty-seven States participate in the Assistance to the States' Tree Planting Program through provisions of Title IV of the 1956 Agricultural Act. This program is intended to facilitate reforestation work on State and private lands for the production of industrial wood. About 100,000 acres are involved annually. Numerous States have utilized this program to foster their tree improvement work through the

development of improved sources of forest tree seed.

The Forest Service, as USDA's designated authority, has the responsibility for implementation of the Organization for Economic Cooperation and Development Scheme for Forest Reproductive Material Moving in International Trade. This is a voluntary program with procedural authority granted to cooperating States under a memorandum of understanding.

Highly Specialized Services

We provide, directly and through cooperating State forestry agencies, highly specialized services to private and public woodland owners, wood-using industries, and others.

During fiscal year 1969, feasibility studies for four Appalachian timber development organizations were carried on--in Tennessee, Kentucky, New York, and North Carolina. The Forest Service provided 1,684 assists to State agencies, 318 to other Federal departments and agencies, 193 to national associations and organizations, 1,952 to private forest landowners, 216 to public forest landowners, 270 to consultants and industrial foresters, 148 to forestry cooperatives, 49 to trade associations, and 452 assists to wood-using industries. Continuing assistance was provided for 51 Resource Conservation and Development projects, five Concerted Services in Training and Education projects, 100 Economic Development Districts, and six Economic Development Regions.

FLOOD PREVENTION AND RIVER BASIN PROGRAMS

Forest lands, which comprise about one-third of the Nation's land base, produce over 60 percent of the total water yield, and are vital to maintenance of water quality. The management of these forest lands affects soil and water behavior. The Forest Service, therefore, helps plan and implement projects to develop and protect water and related land resources, and takes part in comprehensive river basin planning programs. This involves cooperation with the sponsors of projects at the local level, with other USDA agencies, with State Foresters, and other Federal, State, and local agencies.

New progress this year included: Developing watershed and environmental programs for expansion of urban areas into forest land; providing economic projections and procedures for watershed programs; updating hydrologic procedures, and cooperating on private forest and wildland aspects of studies under the Wild and Scenic Rivers Act (P.L. 90-542).

Emergency Flood Prevention Projects

Funds are available under the Flood Control Act of 1950 for the emergency treatment of watersheds impaired by fire or other natural disasters, so as to prevent subsequent loss of life or serious flood, erosion or sediment damage.

In cooperation with the Soil Conservation Service and other Federal, State, and local agencies and groups, the Forest Service treated six such burned areas in fiscal year 1969. Four were in California, one in Oregon, and one in Washington. The total area was 110,410 acres of forest land of which 74,490 acres were National Forest System lands.

Emergency measures installed included grass seeding on 80,600 burned acres; treatment of 232 miles of road, trail, and fireline stabilization; constructing a temporary debris basin, and 5 miles of stream channel clearing and sediment control. Also, fertilization of 13,861 acres of land seeded to grass, reforestation of 2,389 acres, rodent control on 4,656 acres, brush seeding on 352 acres, 7 miles of fencing, and deferred grazing on 11,575 acres.

These emergency measures cost $920,000, of which about $264,000 was from emergency Section 216 funds and $556,000 from other Federal, State, and local funds.

Congress provided $4 million supplemental funds at the end of fiscal year 1969 to finance needed emergency measures resulting from the 1969 California floods and other emergencies. Emergency measures include the grass seeding of burned areas and land slips and slides, stabilization of gullies and other critical erosion areas, channel clearing and stabilization, and the construction of debris basins and check dams. The greater part of this emergency work will be installed in fiscal year 1970.

Small Watershed Program

Projects to solve local land and water problems (erosion, floodwater, and sediment damages)—and to conserve, develop, utilize, and dispose of water so as to preserve and protect the Nation's land and water resources—are formulated, planned, and installed under the authority of Public Law 566. Planning and technical assistance to the local sponsor is provided for forest land by Forest Service personnel in collaboration with the USDA Soil Conservation Service and State and local agencies.

Urban areas of watershed projects are receiving assistance under a new phase of this small watershed program. Proposed PL-566 projects, which include communities now expanding rapidly into forested areas, are being planned to fully utilize, maintain, and improve the existing protective forest land cover of trees and related growth. Wherever appropriate, technical forestry assistance is provided to install protective measures and assist community leaders (rural and urban) in planning forest greenbelts, protective buffer strips, zoning, etc.

Since the program began in 1954, forest land treatment programs have been included in 615 projects involving over 16.1 million acres of forest land including 1.6 million acres of National Forest, with total costs of nearly $41 million. Of this, $9.5 million will be funded through PL-566 and more than three-quarters will be provided by local landowners or other cooperating agencies. Over $7.1 million is proposed to install forestry measures on National Forests, including $1.9 million funded through PL-566 before the use of PL-566 funds to install conservation measures on public lands was prohibited.

During fiscal year 1969, forestry measures were installed on 322 watersheds (see table); 240 were assisted with PL-566 funds. Included were 17,500 acres of tree planting; 2,430 acres of range and grass seeding; 106,667 acres of forest stand improvement; forest watershed management planning on about 150,000 acres; intensified fire protection on 185,600 acres; woodland thinning and release on 172,626 acres; 1,543 acres of special purpose terraces and furrows; 166 structures for water control; 39 miles of road stabilization, and 356 miles of skid-trail and logging-road erosion control.

In addition, forest land surveys and investigations were continued on over 500 watershed projects approved for planning, covering over 52 million acres, of which about 15 million is forest land. There were 103 watersheds authorized for installation during the fiscal year, of which 14 included National Forest System lands.

Major accomplishments achieved during fiscal year 1969 are shown in the following table:

Forest Service Works of Improvement Installed in Watershed Projects

(PILOT AND PL–566 WATERSHEDS)

Item	Unit	Installed in fiscal year 1969	Estimated total practices on land as of June 30, 1969
Land Treatment Measures:			
Channel stabilization	Miles	1	6
Forest stand improvement	Acres	106,667	810,391
Forest watershed management planning	Acres	149,988	949,241
Fire control intensified protection	Acres	185,602	885,193
Fire control roads, trails, firebreaks, and fuelbreaks	Miles	216	723
Fire control, water developments	No.	2	8
Fire towers	No.	0	8
Heliports and helispots	No.	0	17
Mobile equipment	No.	10	47
Other structures (fire control)	No.	0	17
Proper harvest cutting	Acres	52,867	202,630
Radio installations	No.	0	47
Range and grass seeding	Acres	2,430	31,236
Road stabilization	Miles	39	329
Skid trail and logging road erosion control	Miles	356	1,804
Special purpose terraces and furrows	Acres	1,543	7,330
Streambank stabilization	Miles	1	22
Structures for water control	No.	166	264
Tree planting and seeding (including critical area stabilization)	Acres	17,502	188,175
Wildlife habitat development	Acres	98	559
Wildlife ponds	No.	21	27
Woodland grazing control	Acres	8,689	234,861
Woodland thinning and release	Acres	172,626	343,838

Flood Prevention Projects

Protection, sound management, and improvement of forest land resources are a vital part of 10 of the 11 flood prevention projects authorized by the Flood Control Act of 1944. Over 7.2 million acres of forest land are involved. Protection, restoration, and improvement of forest land in nine of these projects were continued in fiscal year 1969, but at a reduced level because of budget limitations.

Principal forestry measures were provision or protection of watershed cover: 20,806 acres of tree planting and seeding, for an overall total to date of over 700,000 acres; 24,534 acres of forest stand improvement, and 19,097 acres of proper harvest cutting. In addition, 4 grade stabilization structures, and over 2 miles of channel and streambank stabilization structural measures were installed.

Intensified fire prevention and control measures designed to protect soil and water values were maintained and strengthened on 2,871,000 acres of private and National Forest System lands within project areas—including 381 miles of fire control roads, trails, fuelbreaks, and firebreaks. Two more fire control structures were constructed and one more mobile fire attack unit was purchased.

Since the start of the projects in 1944, over 2,360 miles of fire control roads, trails, firebreaks, and fuelbreaks have been constructed. This work has not only contributed greatly in preventing disaster fires, but also has provided access for hunters and horseback riders, improved wildlife habitat, facilitated other project work, and reduced overall installation costs of needed soil stabilization measures in the more remote areas of the projects.

The effectiveness of the flood prevention measures including intensified fire control is illustrated in the Los Angeles River Flood Prevention Project. A phenomenal rainfall of 40.57 inches for the 1968–1969 season was recorded at the Oak Grove Ranger Station; over half of this fell during the January 1969 storms. Other stations recorded over 30 inches during a 9-day storm period. Despite widespread severe flooding throughout this southern California area, little damage occurred within the Los Angeles River Flood Prevention Project area, where upstream project measures had been installed. Heavy damage occurred in adjacent areas, particularly in the San Gabriel Watershed, with no such installations. Enlargement and increased effectiveness of fire control organization and facilities, and other flood prevention measures within the Los Angeles River Project area helped hold down flood damages (see next section). The Santa Ynez Flood Prevention Project was similarly benefited.

Major accomplishments achieved during fiscal year 1969 are shown in the following table:

Forest Service Works of Improvements Installed in Flood Prevention Projects

Item	Unit	Installed in fiscal year 1969 (all funds)	Estimated total practices on land as of June 30, 1969
Structural measures:			
Access road construction	Miles	0.6	22.7
Channel improvement	Miles	0	11.6
Channel stabilization	Miles	1.92	42.17
Floodwater retarding structures	No.	0	1
Grade stabilization structures	No.	21	371
Streambank stabilization	Miles	00.19	5.30
Land treatment measures:			
Forest stand improvement	Acres	24,534	556,001
Forest watershed management planning	Acres	122,511	808,500
Fire control roads, trails, firebreaks, and fuelbreaks	Miles	381	2,362
Fire control, water developments	No.	0	137
Fire towers	No.	0	46
Heliports and helispots	No.	0	432
Mobile equipment	No.	0	75
Other structures (fire control)	No.	1	169
Permanent radio installations	No.	2	307
Proper harvest cutting	Acres	19,097	265,621
Roadbank stabilization	Miles	45	873
Skid trail and logging road erosion control	Miles	19	1,177
Tree planting and seeding (including critical area stabilization)	Acres	20,806	704,008
Woodland grazing control	Acres	2,159	169,679
Woodland thinning and release	Acres	25,338	348,145

River Basin Programs and Interagency Coordination

The Forest Service also cooperates with other Federal agencies and State Governments in comprehensive river basin studies for the complementary development of water and related land resources. These studies are coordinated by the Water Resources Council established by the Water Resources Planning Act (Public Law 89–80 of July 22, 1965). Plans that result from river basin studies contain the programs and recommended proposals of the Forest Service for the forest resources of the basin in terms of four main national objectives: National income, regional development, environmental enhancement and preservation, and well-being of the people. Over three-quarters of our Nation's forest land is included in current studies.

In fiscal year 1969, we participated in 68 major river basin studies—an increase of 30 percent over fiscal year 1968, due to the addition of new starts along with the continuation of current studies. Each of these studies requires the joint efforts of numerous professionals and technicians of many disciplines, and a score or more of Federal and State agencies. Plans include detailed studies of a river basin's climate, hydrology, geology, land resources, minerals, recreation resources and potential, fish and wildlife, and economic base and potential as well as many other economic, social, and environmental aspects pertaining to water and related land resources.

Present conditions and problems are assessed, and problems and needs are projected for 10, 30, and 50 years hence, along with recommended solutions.

The Forest Service participated in the Water Resources Council activities, including review of studies submitted to the Council, preparation of the Council's findings for the President and Congress, and service on several technical committees.

In addition, we reviewed 18 major water resource development project reports, prepared by the Corps of Engineers and Bureau of Reclamation, as to impacts on forest resources and Forest Service programs, mitigation requirements, enhancement possibilities, and opportunities for program coordination.

During the year, we collaborated with the Bureau of Outdoor Recreation in developing criteria and procedures for the non-Federal forest land aspects of studies being made under the Wild and Scenic Rivers Act of 1968 (P.L. 90-542). Data and preliminary findings were developed for four studies—the Suwanee, Upper Iowa, Allegheny, and Little Miami rivers—for which the Department of the Interior has leadership responsibility.

FOREST PEST CONTROL

Protection of the forest resource involves the prevention, detection, evaluation, and suppression of insects and diseases. In 1969, the Forest Service carried out many detection surveys, evaluations, and control projects to identify and assess problems and to minimize losses. We also provided consulting and advisory services on the survey and control of forest insects and diseases. In addition to the National Forests, activities covered other Federal forest lands in cooperation with the other Federal agencies, and State and private lands in cooperation with the States.

Pesticide Issues

Pesticide issues demanded a large share of time from the Division of Forest Pest Control during the year. Despite greater restrictions on pesticide use, the Forest Service managed to forestall any significant increase in losses from insects and diseases. Many aspects of pesticide use are still unsettled at year's end. However we are confident that we can adjust to future constraints that may be imposed on pesticides.

Several pilot tests were made to assess new methods and techniques and to measure efficacy of new promising pesticides that avoid undue environmental contamination. Of greatest significance was a decision to use Zectran for future spruce budworm control if supplies from the manufacturer can be assured.

Insect Control

Millions of acres of forest properties were

surveyed by air and ground to discover outbreaks of economically important forest insects. Control was carried out wherever justified, giving thorough consideration to economic principles and biological soundness, and commensurate with protection of the environment.

As in the past, much effort was expended in the West and South to contain **bark beetle** outbreaks. Losses by the destructive southern pine beetle were variable but the overall trend was downward. Control operations were required on National Forest lands in Alabama, South Carolina, and Tennessee; and on both National Forest lands and State and private lands in Louisiana, Mississippi, North Carolina, and Texas. Emphasis was placed on salvage rather than direct control.

For example, in North Carolina alone over 14.5 million board feet and 30,000 cords of round wood were salvaged, while only 9,000 trees were treated by chemicals or by cutting and burning. For direct control of the persistent mountain pine beetle outbreaks in lodgepole pine stands of the Intermountain West, the major effort was placed on high-use areas and in stands where timber sales are underway or pending.

Some control work on mountain pine beetle and other bark beetles such as Douglas-fir beetle, spruce beetle (including Alaska), western pine beetle and roundheaded pine beetle was required in most western States. Included were suppression projects on non-Federal lands in cooperation with States of Colorado, South Dakota, Wyoming, and California.

Suppression of **defoliating insects** covered a very minor acreage compared to most previous years. Only 33,855 acres were treated—including 19,624 acres of leaf rollers and cankerworms in New Jersey and spruce budworm in Minnesota. The remaining 14,231 acres were treated as pilot tests, on spruce budworm and hemlock looper, to evaluate efficacy of new pesticides and modified application techniques. Knowledge gained from these tests will be of great value in working out control methods not dependent upon persistent pesticides.

Various shoot and tip moths, weevils, and sucking insects required attention in various parts of the nation. Of major significance were special surveys, evaluations, or small-sized suppression projects on European pine shoot moth in Oregon and Washington, Saratoga spittlebug in Michigan and Wisconsin, white pine weevil in New York, and balsam woolly aphid in Oregon and North Carolina.

Disease Control

The white pine blister rust control program in 1969 included further comprehensive surveys and evaluations. These will determine if current work on five-needled pines nationwide is as economically and biologically sound as possible and whether there is a need for modification.

A cooperative study was started in Glacier National Park to combine pruning and direct canker treatment to reduce rust losses on esthetically valuable whitebark and limber pines. This may be a possible alternative to ribes eradication which has proved ineffective as a control method in the Park.

In California ribes eradication has been deferred, except in valuable plantations, until surveys and evaluations are completed. Scouting surveys in the southern Sierra Nevada confirmed presence of rust infection at Mountain Home State Forest some 150 air-miles south of the Dodge Ridge infection center on the Stanislaus National Forest. (For many years Dodge Ridge was the southernmost site of infected sugar pine.) Several infection centers were then found between the two. Because of these new finds, ribes eradication will not be resumed there. Instead the systematic detection and elimination of individual infection centers will be considered.

In Oregon, the acreage on which ribes eradication has been carried out in western white pine management areas has been reduced by about 80 percent.

Other minor changes will take place next year. Based on recent evaluations in the southern Appalachians, control work as conducted in the past on the George Washington and Jefferson National Forests in Virginia has been postponed for the next ten years. Similar evaluations have recently been completed in Great Smoky Mountains National Park and on State and private lands in North Carolina. Future work on these lands will be determined following analysis of findings.

In 1969, **dwarf mistletoe** surveys were performed on 211,959 acres and control work was accomplished on 24,033 acres in various parts of

the West. These figures do not include all work accomplished—since survey work is often integrated into timber sale preparation and post-sale TSI projects, and some control work is automatically carried out during harvest and regeneration activities. Overall, more biological evaluation and presuppression survey work was undertaken than in the past—to allow for better decisions in determining amount and method of control to use. Some dwarf mistletoe survey and control work was carried out on State lands in Washington on a cost-sharing basis. This is the first instance of a cooperative project on dwarf mistletoe control.

The Federal-State cooperative **oak wilt** control programs were realigned in Pennsylvania and West Virginia. Twelve large areas totaling approximately 3 million acres were set aside to evaluate effectiveness of the control program. On six of the areas, or 1.5 million acres, surveys and control will be carried out as in the past. On the other six areas of about 1.5 million acres, surveys will be made and ground data collected in the same manner as on the control areas but infected trees found will not be treated. Annual oak wilt incidence on the control areas will be compared with incidence on the no-control areas.

Oak wilt trend surveys made in selected areas of Kentucky and Tennessee indicated that disease incidence in these two States remains at a low level. A disease center was found in South Carolina for the first time.

Other Projects

Several administrative studies were started to appraise operational feasibility of key research findings. Results of three different studies on control of annosus root rot in the southern States, in California, and in the Pacific Northwest will be of special importance to determine practical application of research leads for control of this disease.

The nationwide detection and evaluation program to discover and assess pest outbreaks on Federal lands and on non-Federal lands in cooperation with 26 of the States continues to pay dividends. Although outbreaks of economically important pests were numerous during the year, no serious outbreaks occurred that could not be coped with when needed.

In cooperation with the Forest Service's Insect and Disease Research Divisions, financial support and program coordination were provided for developmental phases of several research projects. Included are the remote sensing and insecticide evaluation projects at Berkeley, California; and the two white pine blister rust projects at Moscow, Idaho—on breeding rust-resistant trees and on developing integrated control through chemical, biological, and silvicultural means. Also, support was given to the virus studies on Douglas-fir tussock moth and European pine sawfly. Accomplishments in 1969 have made registration of the viruses in 1970 appear promising.

COOPERATIVE FOREST FIRE CONTROL

The Northeastern Forest Fire Compact was joined by the Province of Quebec, Canada. This historic event marks the first international forest fire protection agreement between the compact States (New England and New York) and Canada. There are 18 States in three other compacts—the Middle Atlantic, Southeastern, and South Central.

511 Million Acres Are Protected

As of Dec. 31, 1969, over 511 million acres of State and privately owned forest and nonforested watershed lands were receiving organized fire protection from State forestry organizations under provisions of Section 2 of the Clarke-McNary Act. This was an increase of about 25 million acres over the same date in 1968, and 32 million acres over 1967.

In calendar year 1969, over 103,000 fires occurred on the protected State and Private area —burning 1.58 million acres—compared with the 1964–68 5-year average of just over 98,000 fires and 1.67 million acres burned. The average burn on those lands is now about 3,000 acres per million acres protected.

Nearly 60 percent of the fires in 1969 were caused by incendiarists and debris burners, which continues a steady uptrend of the past several years. Also, fires over 300 acres in size accounted for less than one-half of one percent

of all fires—yet accounted for nearly 39 percent of the total area burned.

Fire Prevention Strengthened

Additional fire prevention work is being stressed, especially in the South and East. States are employing specialists in fire prevention who work directly within the bad fire areas. Law enforcement is being emphasized and efforts are being made to strengthen State fire prevention laws.

Specialized training is being sponsored by the Forest Service to better enable States to cope with the fire problems. A fire behavior school especially adapted to local needs was held in the South. Further specialized sessions are planned.

Availability of Federal excess property, especially aircraft, continues to provide States with more capability to increase fire control effectiveness. Aircraft also are being used more and more in patrol and fire detection as well as in suppression.

A significant forward step was made through agreement of all wildfire control agencies to a uniform fire reporting system. All agencies will now report statistics uniformly and fire definitions will be uniform. This will make for more reliable national wildfire statistics.

COOPERATIVE FOREST FIRE PREVENTION

Smokey Bear Income Rises

Royalty income from licensed commercial producers of Smokey Bear toys and other items reached an all-time high of $111,726 in 1969. Under a special provision of the Smokey Bear Act of 1952, such receipts shall "be available for furthering the nationwide forest-fire prevention campaign."

Federal, State, and Canadian cooperators purchased $283,000 worth of Smokey Bear posters and other materials for their 1970 campaign against forest fires, in addition to the $75,500 in allowances granted to State and Forest Service units. Both figures are new highs, indicating recognition of the need for stepped-up prevention efforts.

Pennsylvania will distribute Smokey Bear's Junior Forest Ranger kits in 1970, under a formal agreement made in 1969 with the Forest Service. There are now 11 State Foresters cooperating in this program. Already operating Junior Forest Ranger Subheadquarters are Alaska, Arkansas, Colorado, Iowa, Kentucky, Maine, Nevada, New Hampshire, South Dakota, and Utah.

TV Spots Win Prizes

CFFP Television Spot announcements released in 1969 won outstanding recognition in competition with "commercials" from the country's top advertising agencies.

Vanishing American (which covers 100 years of historical events), won four awards: the Sweepstakes award in the Don Belding contest in Los Angeles, the Best in the West award of the American Advertising Federation, Supreme award at the North American Forestry Commission's International Festival of Forest Fire Control Films, and a Bronze Lion award at the International Film Festival for Commercial Films at Cannes, France. With the help of Foote, Cone & Belding's Toronto office, this spot film announcement is being fitted with a new sound track featuring Canadian historical events. The *Vanishing Canadian* will be released in the spring of 1970.

Deadliest Animal won some awards in the U.S.A., but fared best at the Cannes Film Festival, where it took a second-place Silver Lion, ahead of *Vanishing American.*

Smokey Bear Awards

Silver Smokey Awards, for outstanding service by forest fire prevention professionals, were presented to Rudolph Wendelin, USDA's Office of Information; Barney Wozniak, Idaho Department of Public Lands, and to James Q. Ricard, New Hampshire Division of Resources Development. A 1969 Golden Smokey Award will be presented to The Lassie Show early in 1970.

Smokey Bear Plaques for statewide or regionwide achievements were presented to Rudy Anderson, Black Hills National Forest; Florida State Fireman's Assn.; Phillip R. Lightner,

Pennsylvania Dept. of Forests & Waters; Alabama Forest Products Assn.; Wayne Leeman, St. Louis Post-Dispatch; Robert T. Radford, Watershed Fire Council, Southern California; Clyde A. Fite, St. Joe Paper Co., Florida; Crest Forest Fire District, Calif.; and to Dave Phillips, Peace Corps, Chile.

The Smokey Bear Show, a weekly series of half-hour animated comedy-adventure films, started a two-year run on the American Broadcasting Company Television Network on Sept. 6, 1969.

Posters by American artists took two of the three Supreme awards in an international forest fire prevention poster contest handled in the U.S. by the CFFP staff for the North American Forestry Commission. A massive Smokey Bear balloon, 58 feet in height, led the Macy Parade in New York City on Thanksgiving Day. The parade was covered by two television networks.

ADVISORY MANAGEMENT SERVICES

Services to States Increased

The advisory management function continues to increase its services to the State forestry organizations in the Eastern States. The objective is to provide methods and systems for more effective use of the State resources available for use in the forestry programs.

During the three years that Advisory Management has been functioning, State Foresters have increasingly called upon the highly skilled training teams which have been developed in the Southeastern and Northeastern Advisory Management Divisions. The overall result will be to increase the managerial proficiency of State forestry organizations.

Some accomplishments during 1969:

1. One-week management training course was given in 10 States and for Area Office, attended by over 500 middle and top management employees.

2. One-week instructor training course was given in 7 States to over 250 State employees. The course was given at departmental level in one State.

3. Workload measurement studies were completed in two States and started in two others. One State reported the study helped to subdivide district workloads more evenly, to allocate personnel more effectively, determine the number of personnel needed now and in the future, and to study the effect of future trends in population and land use on workload.

4. Special management studies and services were provided. Among these were a shop manning study and guide, radio technician manning guide, purchase and procurement systems analyses, inspection and safety systems installation, and implementation of a directives system.

5. A computerized personnel management system is being developed for State use; one State was assisted in converting its fire reporting to a computer system.

6. In-depth organizational studies were made at the request of four States; consulting service was provided in long-range programs, organizational changes, and systems modification in 12 other States.

Other projects of special note are: participation in Information and Education workshops at three universities; development of two exhibits in connection with meetings; holding a communication workshop in one State, and a supervisory theory course in another; and providing staff and logistical support for training and other meetings for States.

More training courses are being developed—in salesmanship, organizational theory and practice, job safety, and other fields.

Advisory Management continues to participate with functional divisions in the timely dissemination of research results.

ADMINISTRATIVE SUPPORT FUNCTIONS

SUPPORT FUNCTIONS are vitally important to the success of all Forest Service programs. Recruitment and training of high caliber personnel; implementation of efficient office organization and management systems; coordination and economic use of funds to assure maximum benefit from each dollar; proper installation and maintenance of facilitating office services; planning of new and special programs; publications, communications, and legislative liaison. . . Without the day-by-day support of these essential operations, the Forest Service could not carry out its assigned responsibilities to protect and manage the 187-million-acre National Forest System, to cooperate in programs with State Foresters, and to accomplish forestry research.

MANPOWER AND YOUTH CONSERVATION PROGRAMS

Unsatisfactory rural living conditions are a national concern demanding effective programs to stimulate rural development. The Forest Service cooperates with various Federal Departments and agencies, States, and local community action agencies, private industry, and other groups to develop and administer programs that assist people who are socially and economically disadvantaged. Conservation and conservation-related work projects on National Forest System lands provide employment and training opportunities for special skills.

Civilian Conservation Centers

We continued to operate 45 Civilian Conservation Centers for the greater part of fiscal year 1969, as authorized under Title I, Part A of the Economic Opportunity Act of 1964, as amended. A balance was maintained between education (primarily to improve reading and mathematics) and work experience (to develop vocational skills). Development of Job Corps Training Standards and implementation of formalized vocational training enhanced effectiveness of the program, particularly job placement of enrollees. Seventy-two percent of all enrollees were placed in jobs or military service, or returned to school.

Effective Feb. 19, 1969 Job Corps was shifted by the President from the Office of Economic Opportunity to the Department of Labor with direction to restructure the program. Twenty-five Centers were closed through program adjustment.

Trade Union participation involving 17 Centers was expanded to include the Brotherhood of Painters, Decorators, and Paperhangers—in addition to the already participating International Union of Operating Engineers and United Brotherhood of Carpenters and Joiners. Expansion has provided approximately 640 specialized training opportunities. Over 270 enrollees were graduated and placed in jobs paying more than $3 per hour.

The value of completed skills training projects exceeded $11.7 million. Over 80 percent of this accomplishment included conservation and conservation-related work on National Forest System lands.

Special Manpower Training

We accelerated our participation in Cooperative Manpower Training programs designed to raise the social and economic level of rural people. Through cooperative programs administered by other Federal agencies, the National Forests

"hosted" over two million man-hours of enrollees' time. These programs include Operation Mainstream, Neighborhood Youth Corps, New Careers, Work Incentive Program, Work-Study, and Manpower Development and Training.

All have the same general objective—training of the disadvantaged to bring them to a level of employability where they can get into the mainstream of society. Placement results have been rewarding with a number of the "hard-core" unemployed and underemployed individuals being placed in jobs in the private and public sector. These trainees acquire training skills on projects designed by the Forest Service and State forestry agencies, as well as accomplishing needed conservation work on these public lands.

DEFENSE PREPAREDNESS

Defense readiness to cope with any unexpected nuclear emergency or wartime disaster is a planned part of regular on-going programs and activities. Such a provision is part of the Department's policy and preparedness assignments to the Forest Service by the Secretary under specific Executive Orders 10998 and 11490.

Fire Defense

In cooperation with other USDA agencies, we trained key attack analysts to calculate nuclear effects and assess wartime damage to rural areas from blast, fallout, and fire. Forty to fifty persons were trained in each of five regionally-held workshops. The attack analysis procedures—for determining the extent and severity of post-attack thermal and fire damage—were extensively revised and simplified after the technical workshops. The revised procedures have been incorporated in the "Supplement on Attack Analysis" for use by USDA State Defense Boards.

Rural fire defense plans by States were revised and updated throughout the year.

The publication "Rural Fires—Prevent 'Em or Fight 'Em," was printed and distributed. This was a joint Federal Extension Service and Forest Service publication, prepared for rural people. "Rural Fire Defense in Wartime" (Mission, Organization, Coordination) was published to achieve understanding of the relationship between fire agencies at all levels and the USDA organization at the county, state, and national level.

The final report of the National Fire Coordination Study, "Defending the U.S. from Nuclear Fire" (304 pp. illus.), was reprinted to meet demands. (This report was prepared by the Forest Service and released in May 1966 under contract with the Office of Civil Defense. It has provided the basis for an operational Fire Defense Program, and is a basic Civil Defense document.) A task force completed review of Part E, Chapter 10, Appendix 1 and 2 of the Federal Civil Defense Guide. Final draft was prepared and published by the Office of Civil Defense.

Airborne infrared fire mapping was continued, and techniques and procedures improved during the year. The scanner was installed in a larger, more suitable aircraft with higher altitude capabilities. Relief crews were also assigned to assure a sustained operation if needed. Twenty-four men from the Forest Service and Department of the Interior agencies were trained to provide skilled interpretation of wildfire imagery. They are available for any emergency fire situation.

The field program for Project Flambeau, the study of the environment in and around mass fires, was formally accepted by the Australian Government at a Mass Fire Symposium and planning meeting held at Canberra in February. The first Australian test was made in October. Through the Technical Cooperation Program, we supplied instrumentation and technicians for the experiment.

Our climatological studies, conducted for the Naval Air Systems Command, were expanded to include upper air and radar observations.

Employee Training

During the past several years, we have prepared many of our employees to survive a natural or nuclear disaster. About 12,000 have taken training in personal and family survival, mostly the standard 12-hour Office of Civil Defense Course of Survival Preparedness, in cooperation with the Department of Health, Education, and Welfare.

In order to meet the needs of all Forest Service employees, including individuals at remote

locations and Conservation Centers, we adapted a major part of the Civil Defense Course to programed instruction. The programed text, "Survival Preparedness for Rural Areas," provides individual learner-centered instruction for those who cannot attend the regular 12-hour course. It will have additional and continuing value as a refresher course. It does not replace the standard 12-hour course for those able to attend at a central training location. The Department reprinted the publication for application throughout all agencies.

Some 875 monitoring stations were maintained throughout the year, including monitor and refresher training according to USDA and OCD standards.

BUDGET AND FINANCE

Receipts and Expenditures

Receipts from the sale or use of National Forest resources (not including National Grasslands) amounted to $319,166,725 in fiscal year 1969. These receipts came from the following major sources:

Timber	$306,810,625
Grazing	3,842,344
Other (including mineral leases and permits)	8,513,756
Total	$319,166,725

This total includes $6,935,762 received from National Forest-revested Oregon-and-California railroad grant lands.

In addition, $2,087,104 was received from National Grasslands and Land Utilization areas administered under Title III of the Farm Tenant Act. Of the latter amount, $595,366 was from grazing fees, $4,611 was from timber sales, and $1,487,127 was from other sources, mostly mineral leases and permits.

Other amounts received, not listed above, included $7,729,927 contributed by cooperators and timber purchasers for cooperative work on National Forest programs; $29,537,364 set aside for timber sale area improvements; $11,904,351 set aside for slash disposal; $2,061,693 from miscellaneous receipts; and $11,319 for restoration of forest lands and improvements.

Also not included in the receipt figures above is $1,699,455 received from the sale of 242,779 Golden Eagle entrance permits to Federal recreation areas. The sale of surplus properties returned $29,665. Congress can appropriate these receipts to the Land and Water Conservation Fund.

Direct receipts and deposits from all National Forest programs totaled $372,498,484. In addition, timber purchasers built roads valued at $93,770,445 incident to timber harvest.

Other Federal agencies collected approximately $28,754,180 for power licenses, mineral leases, and permits on National Forest land of public domain origin.

Operating expenses for National Forest programs, National Grasslands, and Land Utilization Projects amounted to $249,385,143. Depreciation of roads, trails, and other improvements was estimated at $73,404,255.

Receipts and all other earnings exceeded operating expenditures and other charges by $172,233,711.

Expenditures for other Forest Service activities included $27,761,519 for cooperative State and Private forestry programs, and $40,677,512 for forestry research. Cooperator contributions to the Forest Service were $1,291,025 for cooperative forestry programs and $735,402 for research.

We also received $100,461 in royalties from the Smokey Bear forest fire prevention program.

Under the act of May 23, 1908, as amended, we pay one-quarter of National Forest net receipts to States for support of schools and roads in counties containing National Forest lands. This payment in fiscal year 1969 (based on fiscal year 1968 receipts) was $52,325,638. Arizona and New Mexico school funds also received $90,193 under provisions of the act of June 20, 1910. Under the act of June 22, 1948, Minnesota received $146,232. In fiscal year 1970 (based on fiscal year 1969 receipts) the payments under these three programs were $78,012,921, $124,709, and $257,955, respectively.

Counties containing National Grasslands and Land Utilization Areas received $538,155 for schools and roads from calendar year 1968 receipts under the Act of July 22, 1937. Payment

to counties for such purposes from calendar year 1969 receipts was $505,888.

By law, the Service retains 10 percent of receipts from National Forest resources for development of National Forest roads and trails, except on revested Oregon and California railroad grant lands. The amount retained in this fund in fiscal year 1969 was $20,931,005; in fiscal year 1970 it is $31,206,198.

Financial Management Improvements

Accomplishments during the year give promise of long-term benefit in our financial management. Highlights are two interrelated courses of action:

1. *New integrated financial management system.* In 1969 the Comptroller General approved the Accounting Principles and Standards of the new system. His staff has worked informally with us, preliminary to completion of the next step—approval of the Accounting System Design. Formal submission of the Design package to the Comptroller General will follow shortly. We expect to receive his final approval of the total system early in 1970.

2. *National Finance Office.* In 1969 the Secretary approved our proposal to centralize accounting, payments, and related financial operations in one finance office at Fort Collins, Colorado. The work now is being done at numerous field locations. Full implementation will be phased over five years. The new accounting system, described above, will be activated as the National Finance Office becomes operational.

ADMINISTRATIVE MANAGEMENT

The Forest Service participated in the beginning efforts of the Government-wide Federal Assistance Review program to improve administrative activities and services to the public. This effort includes a study of grant, cooperative aid, and technical assistance programs, and a study of delegations of authority and other internal and external constraints.

During 1969, the number of Ranger Districts was further reduced by 17 through consolidation for more effective management. Total annual savings was $400,228. Since early 1967, the number of Districts has been reduced by 48—from 822 to 774.

Communications and Electronics

The Branch of Communications and Electronics completed a 5-year effort to convert registration records for all radio stations to automatic data processing. To complete the task, 2,625 entries were processed this year into the ADP records system of the Interdepartmental Radio Advisory Committee of the Office of the Director of Telecommunications Management. The Department of Agriculture is now authorized about 7,150 radio stations. About 6,800 of these are for Forest Service use.

This year we initiated a major study of all aspects of Service-wide computer and related needs. Necessary field data have been gathered and analysis begun in the following areas: Present and future computer workload, present and projected hardware, data communications, source data automation, computer personnel, organization and management practices of computer operations, and present staff and management understanding of data automation and its place in the organization. While the study is primarily being conducted by in-service specialists and analysts, some segments are being handled by contract. Study recommendations will be completed early next fiscal year.

Civil Rights

In addition to emphasizing internal employment and advancement of minority group members, we continued our program under Executive Order 11246 and Title VI of the Civil Rights Act of 1964.

We awarded 1,591 construction, maintenance, and purchase contracts subject to Executive Order 11246. Prework conferences with contractors stressed the rules under this order as they applied to private contractors and any subcontractors.

Financial assistance under four Forest Service programs is subject to the requirements of Title VI of the 1964 Civil Rights Act. Operations of contract recipients are reviewed periodically to assure continued compliance with the law.

Since the law was passed, noncompliance action has been necessary in only 86 of 10,393 cases. Of the 86 cases, 39 have complied, 16 have resulted in termination of assistance, 21 are still under negotiation, and 10 are pending determination of action.

Reports Review Savings

We conducted a Service-wide review of reports which resulted in the elimination of 50 reports for a savings of $67,760 and the improvement of another 43 reports for a savings of $21,850. Total savings, attributed directly and indirectly to the review, is estimated at about $113,600. Other tangible benefits include a current inventory of internal and external reports, and a reasonable cost estimate for each report and the total program cost.

Cost Reduction

Savings resulting from the Cost Reduction and Operations Improvement (CR&OI) program amounted to $13.2 million in fiscal year 1969. As a highlight of this program, four Forest Service employees received the Secretary's special merit award for outstanding cost reduction achievement. These employees, along with 31 others in the Department, were honored in a special ceremony in Washington, D.C., on Nov. 19, 1969. Bureau of the Budget circular number A-44, Management Improvement Program, is being revised to reflect a new emphasis and direction. This revision will expand the program and place more emphasis on cost reduction and management improvement.

Employee Suggestion Program

This program continues to require the increased use of management analysts, technicians, and functional specialists. They must evaluate and coordinate employee suggestions with current and planned management improvement efforts within the Service. As part of the improvement in the Government-wide Incentive Awards Program, the administration of the suggestion program was streamlined in both the headquarters and field offices. This resulted in increased economy, efficiency and effectiveness. Of some 1,700 employee suggestions received during fiscal year 1969, over 500 received recognition or cash awards.

Workload Analysis and Work Planning

A workload analysis of the Forest Service job of promoting State and Private Forestry programs was completed this year. The analysis covered the job in Area and Regional Offices. The workload data for National Forest Systems work in Regional Offices, Forest Supervisor Offices, and District Ranger Offices were completed in 1969. The new data will be available to these offices for use with f.y. 1971 programs.

Other Accomplishments

A 3-year study involving Government-owned housing in the Forest Service has been completed. The summary report identifies (1) the current vital statistics associated with the Service's quarters rental program; (2) certain other management trends and indicators, and (3) the results of the 3-year effort to develop an index method for adjusting base rental rates.

An updated edition of the booklet, "Organization and Management Systems in the Forest Service," has been completed. The booklet offers a popular and quick review of the basic elements of Forest Service mission, management, and organization. It is especially useful to new employees and to interested outside individuals.

Action was taken to streamline the processing of Forest Service documents for publication in the Federal Register; the dual numbering system of Secretary's Forest Service Regulations was eliminated by publishing the codified regulations in a handbook; and distribution of the Federal Register and Code of Federal Regulations was increased.

We now furnish directives amendments for 7,800 Manual Titles and 6,500 Handbooks to 788 mailing points outside the agency. The material is furnished at cost to the public under the Information to the Public Law. State and Federal agencies receive the material free.

ADMINISTRATIVE SERVICES

In fiscal year 1969, the total value of all procurement transactions exceeding $100 each amounted to $101,474,000. This was 59 percent of the total value of all such procurement executed by the entire Department of Agriculture. During the year the Forest Service entered into 4,724 formally advertised and negotiated contracts valued at $74,841,000. Small businesses received over 90 percent of the contracts awarded.

Contract Management

Workshop training to develop professional competence in management of public works construction contracts was attended by 96 contracting officers and engineers. Sessions were held during February and March 1969 at San Francisco and Atlanta. A new approach of presenting training material to trainees was instituted at these workshops. Through preplanning, case material from actual problem contracts resolved by USDA Board of Contract Appeals and the Comptroller General was analyzed and critiqued by participating personnel. Technical guidance was given each team by an experienced leader.

Following identification and analysis of critical issues in each case, recommended remedies were proposed to the group as a whole. Through this approach, interest in subject matter was heightened.

Contracts provide equal employment opportunities to prevent discrimination due to race, color, creed, national origin, age, or sex. Contractors are required to take affirmative action, and contract compliance officers review programs to ensure that equal employment opportunities are provided.

Added emphasis was given to channeling contracts for such resource management items as tree planting, pruning, ribes eradication, etc., to small contractors in rural areas. Attempts are being made to reduce seasonal influence on public works contracting. These efforts should improve availability of more job opportunities in depressed, remote rural areas. Skilled and unskilled craftsmen in many such areas rely heavily on employment offered by Forest Service projects.

Excess Property Acquired and Reassigned

During f.y. 1969, Forest Service programs were substantially aided by acquisition of needed equipment and materials from Government surplus, with a value exceeding $10 million. Property excess to our needs, worth about $0.75 million, was reassigned to other Department or Federal agencies to meet their needs.

In furnishing continuing aid to States, property excess to our needs and valued at about $0.5 million, was donated for educational, public health, or State Civil Defense purposes.

Our State Cooperative Fire Control Program efforts assigned to State Foresters property valued at over $9 million.

Under this program, we also arranged for loan from the Department of Defense an additional 10 aircraft for use by State Foresters in rural fire control.

During the year, 40 proposed long-term leasing requests from our field units were initiated through the Department to provide more suitable office space or to relieve overcrowded situations. These transactions involved approximately 185,000 sq. ft. of office and support space.

PERSONNEL MANAGEMENT

Personnel Management activities for 1969 were guided by the main currents of the Personnel Programs and Systems Review. This report concentrated on improvements needed to meet the demand of the future.

Training

Executive, management, or technical training was provided for employees at all organizational levels. Some participated in the Federal Executive Institute and some were selected for Fellowships in Congressional Operations and the Career Education Awards program.

Fifty-two employees were enrolled in universities for full-time training of from 1 to 2 years. Forty-two Research personnel received ad-

vanced training. Others pursued Engineering; Program, Planning & Budgeting; Public Administration; Math and Statistics; and Regional Planning.

We began a series of training technology workshops for employee development officers and training specialists. This will enable them to use modern analysis and training methods in the design of cost-effective training programs.

Work was started on a new guide to employee development. It contains: (1) Questions to prompt decisions about career goals; (2) Procedures for planning growth experiences and career adjustments; and (3) a catalog of training tools available Service-wide.

A Memorandum of Agreement was entered into with the USDA Graduate School. It will enable the Forest Service to effectively obtain needed services offered by the Graduate School, including analysis of training problems and administration of Forest Service basic courses. The first project involves: (1) Administration of correspondence-type courses in motivation, communications and work planning; and (2) Analysis and recommendations for training in labor-management relations.

A new program for using performance ratings in promotion and reassignment decisions was implemented Service-wide for employees in grades GS-13 and up. Implementation for other employees will occur in 1970. Orientation and training was provided to insure understanding of the new program and to encourage good practices in performance rating by supervisors.

Action plans and new programs were started to make some of the needed improvements pointed out by the 1968 Personnel Programs and Systems Review report, subtitled "A Critical Self-Evaluation." In addition, employee opinions about existing personnel policy and programs were quantitatively determined via an attitude survey which established a 1969 baseline. Remeasurement in 1971 will determine progress and accomplishments.

A study of Forest Service careers was undertaken cooperatively by the University of California at Los Angeles. It reviewed the changing expectations of our employees in regard to acceptable jobs, careers, personal growth, and development. The study also reviewed National Forest responsiveness to unexpected challenges, new and unaccustomed missions, and to increasingly complex technology.

Employment

Since July 1, 1969, all offices have been operating under the new Merit Promotion Plan. Two provisions are: A full discussion with employees of their ratings for promotion, and the opportunity to apply for positions outside the minimum area of consideration.

Working with the Department's Office of Personnel and the Agricultural Research Service, we implemented on a pilot basis an automated personnel information system known as MOHR (Management of Human Resources). The Southern Region and the Forest Products Laboratory are operating and testing the program. An evaluation team will recommend whether the program should be adopted Service-wide.

We recommended consolidation of certain Schedule A authorities to simplify the employment of temporary and seasonal employees. The Department amended it for use in all agencies of Agriculture. The Civil Service Commission approved the consolidation. This consolidated authority eliminated the need for at least eight excepted employment authorities for temporary, intermittent, or seasonal employees in the field.

One of the most significant achievements in Forest Service efforts to ensure Equal Employment Opportunity was the negotiation and consummation of a Memorandum of Understanding between the Southern Forest Experiment Station and Tuskegee Institute, Alabama. Under terms of this agreement, a research forester has been assigned to work on the campus. He assists in the development and implementation of a pre-forestry program for Negroes and provides advice and counsel to interested students. He assists the college in conducting a training course each semester introducing freshmen and sophomores to forest land management and to forestry career opportunities.

Employee Relations

The guide, "Resolving Performance Problems," was developed to help work supervisors identify problems and resolve them in the early stage. A new procedure for handling complaints of discrimination in employment because of race, color, creed, sex, and national origin was

implemented. Service-wide, about 50 counselors have been formally trained and designated. Implementation of new CSC and USDA policies on incentive awards is leading to more recognition of employees by management, and streamlining of the program.

New emphasis has been put on pre-retirement counseling. New concepts are being developed to improve current programs. Increased effort is underway to utilize the results of the PPSR (Personnel Programs and Systems Review) in the employee relations programs.

Classification and Pay

A study was begun directed toward revision of classification and qualification standards for the principal Forest-oriented technician occupations. Our classifiers worked with the Department and the Civil Service Commission in reviewing and field-testing job grading standards and qualification standards for "blue-collar"-type jobs. In addition, a number of classification and qualification standards for "white-collar" positions were field-tested and either have been or will be revised.

We implemented a new pay plan for emergency firefighters which provided for payment on an hourly or daily rate basis, depending on length of work assignment. The intent of this plan is to decrease the administrative overhead needed for timekeeping and increase the equitability of employee compensation. We revised our Time and Attendance Handbook and the Report form; the new features proved to be significant time and money savers.

Special training in work classification and pay procedures was provided for field personnel management specialists. We contributed to the MOHR implementation program by developing GS-series codes for qualifications screening. In cooperation with the USDA Office of Personnel, we developed proposals to the Civil Service Commission for the improvement of the Federal Classification, Pay, and Leave systems.

LEGISLATION

During the first session of the 91st Congress, two additions made to the National Wilderness Preservation System highlighted legislative activities affecting the Forest Service. Acts designating the 98,000-acre Ventana Wilderness (Public Law 91–58) and the 63,500-acre Desolation Wilderness (Public Law 91–82), both in California, were approved.

During the first session, we followed day by day some 700 bills which would affect our activities. We prepared 142 legislative reports on bills and legislative proposals; assisted in the preparation and presentation of 25 statements before Congressional Committees; and reviewed and commented on 52 reports prepared by other agencies. Legislative drafting services were provided as requested on 8 proposed bills.

PROGRAMS AND SPECIAL PROJECTS

The Division of Programs and Special Projects continued the evaluation of Forest Service programs and development of Program and Financial Plans for fiscal years 1970–1974. The Division is experiencing varying degrees of success in the continuous task of identifying and describing final program outputs.

Timber Programs Analyzed

The rapid rise in lumber prices experienced in early calendar year 1969 stimulated Congressional interest in the timber supply situation on the National Forest System. This caused increased activity in the analysis of the Forest Service timber management program. The following were major accomplishments:

—A special study was made for the Public Land Law Review Commission to determine effectiveness of Forest Service programs in the production and utilization of wood and wood products.

—In conjunction with the Department's Program Evaluation and Planning (PEP)

Staff, we replied to two Bureau of the Budget questions on the production of timber from the National Forests. One discussed means of meeting the President's housing goals with specific constraints on wood prices.

—Analysis of the National Timber Supply Act, HR–10344, in preparation for committee hearings and legislative reports.

—Support of the Division of Cooperative Forest Management in developing a comprehensive CFM study plan.

—Conduct of in-depth reviews of the Pacific Northwest Douglas-fir Study.

Other Studies

Other special studies and projects undertaken include:

—Providing analytical support and assistances to Regions.

—Developing computer programs for distribution to Regions to aid in discounting program costs and benefits.

—Acquisition of remote terminal connected to IBM 360 to provide computer capability in program evaluation.

—Providing guidelines and suggestions to Regional Offices, Stations, and Area Offices for conducting PPB-type analysis at Regional level.

—Supporting Phase II of the Pacific Southwest Hydrologic Study.

—Finalizing a spatial distribution model (Gravity Model) as part of a tentative Reccreation Allocation System.

—Completing a national analysis concerning distribution of campground capacity as related to population considerations.

—Preparing several transition papers and special reports for the new Presidential Administration.

—Attendance by three men at Michigan State University for nine months of full-time training in systematic and economic analysis.

PUBLIC LAND LAW REVIEW COMMISSION

During calendar year 1969, the Public Land Law Review Commission held eight meetings with its Advisory Council in Washington, D.C. at which 18 completed study reports were discussed.

The Forest Service continued coordination among USDA agencies in all studies. Chief Edward P. Cliff was named alternate to represent Assistant Secretary Thomas K. Cowden as USDA Liaison Officer to the Commission.

Thirty-four studies and analyses were designed by the Commission to be performed by independent contractors, consultants, or the PLLRC Staff. Ten subjects remain to be discussed by the Advisory Council prior to the final report to be presented to the President and the Congress June 30, 1970.

APPENDIX

Statistical Tables

TABLE 1.—*National Forest and other lands administered by the Forest Service, as of June 30, 1969*

State and Commonwealth	National Forests and Research Areas	National Grasslands	Land Utilization Projects [1]	Total
	Acres	*Acres*	*Acres*	*Acres*
Alabama	632,161	0	0	632,161
Alaska	20,723,442	0	0	20,723,442
Arizona	11,436,757	0	0	11,436,757
Arkansas	2,448,779	0	0	2,448,779
California	20,021,126	0	19,115	20,040,241
Colorado	13,721,431	612,193	560	14,334,184
Connecticut (Insect and disease lab, Hamden)	10	0	0	10
Florida	1,080,212	0	0	1,080,212
Georgia	803,938	0	9,340	813,278
Idaho	20,304,170	47,599	0	20,351,769
Illinois	237,237	0	0	237,237
Indiana	148,741	0	324	149,065
Iowa	0	0	360	360
Kansas	0	107,708	0	107,708
Kentucky	548,149	0	0	548,149
Louisiana	593,447	0	0	593,447
Maine	49,551	0	465	50,016
Michigan	2,662,167	0	3,800	2,665,967
Minnesota	2,780,472	0	0	2,780,472
Mississippi	1,135,161	0	0	1,135,161
Missouri	1,403,510	0	12,938	1,416,448
Montana	16,669,523	0	0	16,669,523
Nebraska	255,241	94,344	0	349,585
Nevada	5,073,625	0	0	5,073,625
New Hampshire	679,935	0	0	679,935
New Mexico	8,969,265	136,505	86,218	9,191,988
New York	0	0	13,779	13,779
North Carolina	1,128,051	0	0	1,128,051
North Dakota	520 [2]	1,104,438	0	1,104,958
Ohio	132,106	0	0	132,106
Oklahoma	240,811	46,758	0	287,569
Oregon	15,356,661	102,980	0	15,459,641
Pennsylvania	494,363	0	0	494,363
Puerto Rico	27,998	0	27	28,025
South Carolina	590,755	0	0	590,755
South Dakota	1,122,876	859,698	0	1,982,574
Tennessee	606,563	0	1,212	607,775
Texas	658,312	117,269	0	775,581
Utah	8,023,488	0	0	8,023,488
Vermont	239,319	0	0	239,319
Virgin Islands (St. Thomas Experimental Forest)	147	0	0	147
Virginia	1,512,318	0	0	1,512,318
Washington	9,043,240	0	725	9,043,965
West Virginia	937,423	0	0	937,423
Wisconsin	1,485,922	0	230	1,486,152
Wyoming	8,702,329	572,315	0	9,274,644
Nationwide	182,681,252	3,801,807	149,093	186,632,152

[1] These lands are the residue of some 7 million acres of submarginal farm lands which were acquired by the Federal Government in the 1930's, with the intent of putting them to their best uses. The National Grasslands were created in 1960 from many of these areas, and large acreages were transferred to National Forests, other Federal agencies, and to State and local government agencies for forest, park, wildlife, and other conservation uses.

[2] Souris Purchase Unit and Denbigh Experimental Forest, McHenry County.

TABLE 2.—*Volume and value of timber cut and sold in National Forests; timber stand improvement, and area planted and seeded to trees, fiscal year 1969*

State	Sales	Timber Sold		Timber Cut		Timber stand improvement fiscal year 1969	Acres Planted and Seeded to Trees	
		Volume	Value	Volume	Value		Fiscal year 1969	Accumulative total planted and seeded thru June 30, 1969
	Number	*M Bd. ft.*	*Dollars*	*M Bd. ft.*	*Dollars*	*Acres*	*Acres*	*Acres*
Alabama	394	54,769	1,799,565	54,598	1,535,982	5,590	9,845	116,325
Alaska	59	8,872,808	27,057,438	522,727	2,181,050	—	—	5,085
Arizona	937	151,059	4,647,137	330,476	5,345,764	20,700	604	13,997
Arkansas	730	128,283	4,832,969	110,569	3,547,971	13,267	9,940	93,282
California	4,241	1,901,839	104,217,919	2,169,938	62,030,651	37,766	29,656	318,325
Colorado	909	181,341	4,455,309	259,198	3,546,256	8,290	5,678	125,082
Florida	270	87,682	1,986,488	72,834	1,548,050	729	13,221	106,491
Georgia	411	57,991	2,045,547	54,357	1,502,507	1,410	1,785	60,153
Idaho	1,730	768,665	25,469,940	1,031,352	17,999,620	8,130	31,975	287,535
Illinois	56	6,021	116,199	6,530	133,251	978	1,635	55,467
Indiana	25	1,896	17,951	4,558	58,481	354	1,325	32,518
Kentucky	202	41,384	685,766	36,890	509,663	3,839	898	8,221
Louisiana	222	75,906	2,871,400	78,354	2,502,911	9,735	2,013	173,113
Maine	8	6,391	52,665	3,783	33,384	1,070	17	100
Michigan	492	190,941	1,178,255	133,621	919,301	10,519	8,794	683,943
Minnesota	546	207,565	1,121,563	102,151	577,469	8,958	12,372	243,934
Mississippi	813	145,542	5,034,822	144,132	4,165,278	13,577	9,052	274,337
Missouri	559	50,893	763,866	47,430	607,279	18,811	4,188	124,686
Montana	1,812	762,490	26,996,137	777,952	19,883,304	14,189	17,634	147,538
Nebraska	3	6	20	1	5	—	—	34,465
Nevada	39	514	2,138	142	722	70	52	1,187
New Hampshire	75	22,015	249,689	32,449	350,081	5,105	—	1,189
New Mexico	1,291	50,317	1,259,175	162,049	2,212,887	10,178	3,855	25,386
New York (LU)	1	1	5	1	5	61	—	42
North Carolina	351	66,547	1,571,458	56,819	1,081,361	5,443	3,379	51,955
North Dakota	8	14	110	6	65	—	—	—
Ohio	45	6,117	54,093	5,986	55,133	240	950	27,228
Oklahoma	47	13,211	394,743	6,287	181,243	2,499	161	13,917
Oregon	2,688	3,000,008	200,988,253	3,327,489	131,201,482	63,072	37,936	629,926
Pennsylvania	77	37,524	1,365,908	43,656	1,374,787	4,759	—	19,900
South Carolina	353	120,288	3,300,575	113,038	2,989,347	1,354	5,090	51,338
South Dakota	141	35,762	196,750	72,592	650,206	2,971	520	47,254
Tennessee	264	43,306	495,411	40,654	577,411	1,692	1,850	18,212
Texas	280	96,118	4,025,831	70,827	2,371,657	1,919	4,642	75,461
Utah	661	40,365	428,365	56,647	325,945	3,981	1,771	19,780
Vermont	26	16,152	693,924	14,754	716,000	4,665	15	1,445
Virginia	298	86,626	727,647	64,028	442,894	2,593	2,006	18,571
Washington	1,367	1,347,411	66,313,588	1,525,909	51,441,037	16,586	24,973	376,178
West Virginia	159	61,653	1,174,992	46,822	818,866	9,530	717	23,918
Wisconsin	317	107,659	1,027,406	75,829	596,028	4,865	5,796	275,756
Wyoming	511	85,862	2,519,791	126,038	981,528	1,753	2,200	21,671
Nationwide	23,418	18,930,942	502,140,808	11,783,473	326,996,862	321,248	256,545	4,604,911

TABLE 3.—*Estimated legal harvest of principal big-game animals [1] in National Forests, National Grasslands, and land utilization projects, fiscal year 1969*

State	Deer	Elk	Bear	Antelope	Moose	Turkey [2]
Alabama	1,639	—	—	—	—	547
Alaska	13,680	98	834	—	731	—
Arizona	9,658	1,215	165	89	—	1,642
Arkansas	1,975	—	—	—	—	495
California	25,603	—	634	46	—	—
Colorado	55,267	14,979	705	609	—	311
Florida	1,515	—	13	—	—	365
Georgia	3,298	—	—	—	—	103
Idaho	56,889	15,087	1,946	1,060	154	5
Illinois	1,917	—	—	—	—	—
Indiana	400	—	9	—	—	—
Kentucky	214	—	—	—	—	11
Louisiana	1,891	—	—	—	—	—
Maine	150	—	—	—	—	—
Michigan	21,348	—	341	—	—	98
Minnesota	12,945	—	253	—	—	—
Mississippi	3,630	—	—	—	—	715
Missouri	3,835	—	—	—	—	325
Montana	45,486	12,019	1,686	725	553	131
Nebraska	485	—	—	190	—	122
Nevada	10,328	4	1	18	—	—
New Hampshire	1,177	—	40	—	—	—
New Mexico	16,295	576	186	35	—	970
New York	200	—	—	—	—	—
North Carolina	3,233	—	227	—	—	12
North Dakota	2,335	—	—	240	—	—
Ohio	42	—	—	—	—	3
Oklahoma	293	—	—	40	—	45
Oregon	81,293	7,424	961	—	—	75
Pennsylvania	9,165	—	—	—	—	1,100
South Carolina	2,003	—	—	—	—	197
South Dakota	12,741	89	1	915	—	686
Tennessee	760	—	48	—	—	38
Texas	1,051	—	—	4	—	—
Utah	69,964	1,287	35	25	25	67
Vermont	738	—	21	—	—	—
Virginia	9,691	—	248	—	—	2,997
Washington	30,029	5,725	1,196	—	—	9
West Virginia	2,964	—	83	—	—	910
Wisconsin	8,398	—	146	—	—	—
Wyoming	36,723	11,647	260	2,970	834	868
Nationwide	562,000	71,000	10,000	7,000	2,300	13,000

[1] Legal harvest of other big game animals for all lands administered by the Forest Service includes 3,000 peccary, 1,460 mountain goats, 375 bighorn sheep, 50 Dall sheep, and 580 wild boar.

[2] Turkey classed as a big-game species for this report.

NOTE—Total figures rounded.

TABLE 4.—*Construction, reconstruction, and maintenance of National Forest (forest development) roads, bridges, and trails, fiscal year 1969*

State and Commonwealth	Roads			Bridges		Trails		Total obligations from all U.S. funds
	Construction and reconstruction	Construction and reconstruction by timber purchasers		Existing		Construction and reconstruction	Existing	
	Miles	*Miles*	*Dollars*	*Miles*	*No.*	*Miles*	*Miles*	*Dollars*
Alabama	11.4	6.7	43,300.00	768.2	—	—	—	591,459.70
Alaska	8.7	14.3	479,366.00	343.9	—	6.8	453.8	2,692,408.03
Arizona	14.9	68.2	397,500.00	10,531.6	—	25.9	3,615.7	3,567,476.72
Arkansas	11.0	4.3	59,010.00	2,696.4	8	—	7.9	1,400,539.20
California	236.0	2,527.7	12,656,278.00	37,322.5	7	44.4	14,872.3	25,571,963.02
Colorado	106.7	46.7	345,565.00	12,530.1	8	69.6	9,631.8	5,857,808.90
Florida	17.9	2.9	16,300.00	1,162.0	2	—	213.1	752,934.18
Georgia	9.7	—	—	1,273.0	3	3.4	238.1	796,929.68
Idaho	66.4	1,172.2	4,592,549.00	18,231.7	26	28.0	18,347.5	9,620,370.80
Illinois	3.0	—	—	421.5	—	—	57.9	363,139.11
Indiana	5.1	—	—	1,107.4	—	—	—	482,300.97
Kansas	—	—	—	68 2	—	—	—	1,571.31
Kentucky	10.1	2.4	13,500.00	1,011.2	—	—	138.9	725,250.05
Louisiana	30.4	—	128,892.00	1,290.7	13	—	—	629,785.30
Maine	3.7	—	—	63.4	—	—	80.5	33,066.44
Michigan	28.2	—	—	5,065.1	2	7.0	168.3	2,236,786.62
Minnesota	13.3	38.2	82,185.00	3,368.6	2	—	628.3	2,330,207.39
Mississippi	1.4	26.3	299,697.00	1,060.0	21	5.0	25.0	625,857.44
Missouri	9.9	6.7	3,633.00	1,758.8	—	—	86.0	732,717.99
Montana	59.1	510.0	3,138,100.00	15,766.6	16	59.0	14,191.5	6,440,488.80
Nebraska	—	—	—	449.9	—	—	21.0	127,948.09
Nevada	—	—	—	3,254.8	3	—	1,750.2	487,162.99
New Hampshire	7.5	5.1	81,980.00	303.1	—	—	1,053.0	652,523.67
New Mexico	15.4	22.9	80,356.00	8,626.4	1	8.9	3,710.8	2,950,330.22
New York	—	—	—	11.2	—	—	14.2	2,715.19
North Carolina	3.6	2.3	14,000.00	1,100.7	—	—	1,196.9	962,822.31
North Dakota	4.4	—	—	1,399.8	—	—	—	81,613.19
Ohio	2.0	—	—	310.2	—	—	—	227,395.30
Oklahoma	0.9	1.7	8,369.00	219.7	2	—	21.4	164,242.32
Oregon	115.4	1,933.3	28,850,149.31	30,513.1	16	39.5	7,341.8	20,810,526.07
Pennsylvania	7.1	208.5	1,190,946.00	957.7	—	12.0	94.3	1,539,349.50
Puerto Rico	2.3	—	—	0.6	—	—	38.9	12,998.51
South Carolina	18.1	22.4	314,400.00	993.0	2	21.0	32.0	576,438.52
South Dakota	22.2	3.0	33,752.00	2,790.7	1	—	29.5	898,968.02
Tennessee	11.4	—	—	803.9	3	—	559.8	746,495.62
Texas	8.6	5.7	62,700.00	812.5	17	—	—	782,521.26
Utah	31.6	—	—	6,992.1	1	—	5,995.4	3,558,536.17
Vermont	2.0	1.3	70,259.00	123.5	—	—	212.1	407,504.84
Virginia	16.3	—	—	1,255.8	1	18.0	1,266.7	1,494,894.50
Washington	39.7	917.4	14,887,154.62	12,471.5	7	63.2	7,124.5	9,856,525.62
West Virginia	18.2	2.4	18,114.00	1,631.6	—	—	789.0	1,027,423.30
Wisconsin	13.7	0.5	923.00	2,996.4	—	26.0	87.4	1,119,231.35
Wyoming	40.5	23.8	189,274.00	5,183.3	4	9.0	6,161.7	2,599,979.56
Wash. office	—	—	—	—	—	—	—	1,836,934.05
Nationwide	1,027.8	7,576.9	68,058,251.93	199,042.4	166	446.7	100,257.2	118,378,141.82

TABLE 5.—*Developed recreation sites by type, number, size, and capacities in the National Forests and National Grasslands, as of June 30, 1969*

Type of facility	Number of sites (classed according to persons-at-one-time capacity)								Developed area	All sites: Normal capacity (persons at one time)
	Under 25	26 to 75	76 to 150	151 to 300	301 to 600	601 to 1,000	Over 1,000	Total		
	Number	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Acres*	*Number*
Campgrounds	1,910	1,717	874	509	160	20	7	5,197	36,531	401,285
Family	1,902	1,679	849	491	155	19	6	5,101	35,537	388,317
Group	8	38	25	18	5	1	1	96	994	12,968
Picnic grounds	574	700	246	122	39	2	0	1,683	7,446	113,189
Family	573	678	229	100	35	2	0	1,617	7,104	103,855
Group	1	22	17	22	4	0	0	66	342	9,331
Campgrounds and Picnic grounds	2,484	2,417	1,120	631	199	22	7	6,880	43,977	514,471
Organization camps	59	129	222	130	21	2	2	565	6,873	73,704
Federally owned	4	23	27	13	0	1	0	68	980	7,764
Privately owned	55	106	195	117	21	1	2	497	5,893	65,940
Water sports sites	284	325	232	165	58	13	8	1,085	2,366	133,085
Boating	277	250	144	72	30	6	3	782	1,660	70,137
Swimming	7	75	88	93	28	7	5	303	706	62,948
Observation sites	179	168	65	16	4	2	0	434	1,009	25,511
Playgrounds, parks, sports sites	1	5	4	6	2	1	0	19	423	3,907
Winter sports sites	3	8	16	30	30	20	91	198	24,549	353,248
Concession sites	49	65	23	3	7	1	1	149	562	12,664
Hotels, lodges, resorts	61	185	77	48	11	4	4	390	3,053	54,394
Federally owned	2	6	3	3	0	1	1	16	277	3,607
Privately owned	59	179	74	45	11	3	3	374	2,776	50,787
Recreation residence sites	1,244	320	209	108	43	8	4	1,936	16,443	100,087
Visitor centers	5	11	4	7	3	3	1	34	308	9,965
Nationwide (all types)	4,369	3,633	1,972	1,144	378	76	118	11,690	99,563	1,281,036

TABLE 6.—*Use of developed recreation sites and dispersed recreation areas by the Forest Service,*

(NUMBER OF VISITOR-DAYS OF RECREATION

State and Commonwealth	Developed recreation sites									
	Observation sites	Playgrounds, parks, sports sites	Boating sites	Swimming sites	Campgrounds	Picnic grounds	Hotels, lodges, resorts	Organization camp sites	Other concession sites	Recreation residence sites
Alabama	—	—	2.6	37.7	102.6	105.5	—	—	—	—
Alaska	7.3	—	2.9	5.4	155.9	88.8	19.4	21.9	—	38.6
Arizona	19.8	12.3	25.1	16.6	1,436.5	484.4	304.0	331.2	22.5	265.3
Arkansas	13.4	—	5.6	66.8	311.2	97.0	65.1	56.3	—	15.8
California	84.8	6.6	274.6	186.8	9,789.5	611.6	1,429.5	2,781.6	104.3	4,491.6
Colorado	77.1	.5	158.7	—	2,093.3	298.8	106.5	153.9	56.7	236.0
Florida	—	—	31.2	75.6	608.2	105.7	—	98.8	—	132.0
Georgia	8.0	—	6.3	29.8	266.1	36.6	12.1	33.5	—	24.5
Idaho	28.7	—	40.0	25.2	1,410.1	108.1	193.2	217.8	3.7	275.6
Illinois	39.7	—	3.6	32.4	101.9	74.4	—	—	—	—
Indiana	.2	—	25.2	13.8	126.4	62.5	—	—	—	—
Kansas	.1	—	—	—	—	6.2	—	—	—	—
Kentucky	4.5	—	4.7	—	134.9	55.3	—	9.4	—	8.1
Louisiana	.5	—	9.4	79.5	120.9	39.5	—	31.5	—	25.5
Maine	2.1	—	—	—	13.8	2.2	—	.8	—	—
Michigan	5.2	5.5	43.0	74.6	600.5	99.7	2.0	65.0	7.7	64.2
Minnesota	.2	—	70.7	25.7	524.7	36.2	119.4	46.6	2.7	153.8
Mississippi	—	—	7.6	10.4	79.2	65.2	—	63.8	—	—
Missouri	.6	—	19.2	1.5	278.3	113.6	—	5.8	—	—
Montana	71.7	—	59.4	20.4	1,012.1	152.3	83.3	98.7	.8	374.7
Nebraska	1.9	—	—	1.8	13.5	10.8	—	36.5	—	—
Nevada	.7	—	—	11.6	228.5	43.0	—	86.7	—	25.4
New Hampshire	18.3	—	.7	4.2	497.9	47.0	69.1	4.5	—	—
New Mexico	44.1	6.5	1.3	—	580.8	202.2	.6	63.5	10.7	78.1
New York	—	—	—	—	5.5	1.5	—	21.0	—	—
North Carolina	25.0	—	13.3	27.5	332.9	211.9	14.6	3.0	6.1	9.8
North Dakota	—	—	—	—	1.3	1.9	—	—	—	—
Ohio	—	—	1.6	29.0	51.7	36.0	—	—	—	—
Oklahoma	20.6	—	2.3	14.5	56.9	30.8	—	—	—	—
Oregon	130.0	—	303.7	60.9	3,808.2	410.8	801.3	392.9	163.8	830.2
Pennsylvania	12.3	—	27.5	29.1	316.8	60.4	—	68.5	—	90.5
Puerto Rico	12.5	—	—	6.0	—	78.2	—	51.0	9.4	1.6
South Carolina	—	—	5.4	4.3	43.1	41.3	—	—	—	—
South Dakota	7.5	2.6	10.1	18.0	322.7	161.9	6.5	42.1	4.4	55.1
Tennessee	4.8	—	7.8	40.7	246.6	92.4	52.7	89.5	—	74.2
Texas	.2	—	15.9	15.0	328.2	49.0	6.1	2.7	—	—
Utah	40.0	.4	45.3	6.4	1,645.2	268.4	236.0	170.2	16.1	209.1
Vermont	3.2	—	—	3.6	53.4	13.0	—	—	—	—
Virginia	7.3	—	3.1	41.2	347.7	84.8	.1	61.5	—	1.1
Washington	67.0	—	56.5	19.3	2,202.4	166.1	184.2	386.7	4.1	337.6
West Virginia	14.1	—	1.6	22.9	308.6	47.8	—	49.6	—	.6
Wisconsin	—	—	24.4	33.2	385.8	19.2	6.1	13.4	—	10.3
Wyoming	34.3	—	19.9	16.2	725.8	80.2	299.4	210.6	.6	162.1
Nationwide	807.7	34.4	1,330.2	1,107.6	31,669.6	4,802.2	4,011.2	5,770.5	413.6	7,991.4
Percent use of developed sites only	1.27	0.05	2.09	1.74	49.68	7.53	6.29	9.05	0.65	12.54
Percent use of dispersed areas only										
Percent use of developed sites and dispersed areas	0.50	0.02	0.82	0.68	19.45	2.95	2.46	3.54	0.25	4.91

[1] Recreation use of National Forest System land and water which aggregates 12 person-hours. May entail 1 person intermittent.

in the National Forests, National Grasslands, and other lands administered
calendar year 1969

USE,[1] IN THOUSANDS)

Developed-type Recreation Areas			Dispersed-type Recreation Areas						
Winter sports sites	Visitor centers	Total use of developed sites	Roads	Trails	Waters	General undeveloped country	Total use of dispersed areas	Total use of developed sites and dispersed areas	State and Commonwealth
—	—	248.4	168.5	14.9	119.0	208.4	510.8	759.2	Alabama
34.5	16.2	390.9	272.7	72.7	510.0	208.2	1,063.6	1,454.5	Alaska
21.3	15.0	2,954.0	1,755.6	102.5	749.8	1,209.2	3,817.1	6,771.1	Arizona
—	—	631.2	521.9	0.2	464.6	401.1	1,387.8	2,019.0	Arkansas
1,314.2	50.5	21,125.6	10,567.0	1,455.4	4,578.8	7,914.7	24,515.9	45,641.5	California
1,209.5	.8	4,391.8	2,962.1	430.3	1,143.5	1,851.4	6,387.3	10,779.1	Colorado
—	.6	1,052.1	206.7	—	473.2	763.7	1,443.6	2,495.7	Florida
—	6.8	423.7	381.1	42.9	159.7	460.8	1,044.5	1,468 2	Georgia
283.6	2.1	2,588.1	1,802.6	371.2	1,418.5	2,736.4	6,328.7	8,916.8	Idaho
—	—	252.0	211.1	29.9	31.1	246.2	518.3	770.3	Illinois
—	—	228.1	197.0	4.5	168.7	64.8	435.0	663.1	Indiana
—	—	6.3	13.7	—	.4	11.8	25.9	32.2	Kansas
—	—	216.9	271.6	52.9	200.6	190.8	715.9	932.8	Kentucky
—	—	306.8	47.8	3.5	43.3	156.5	251.1	557.9	Louisiana
—	—	18.9	7.5	3.6	3.2	7.0	21.3	40.2	Maine
168.9	—	1,136.3	1,293.0	187.7	492.5	1,035.6	3,008.8	4,145.1	Michigan
13.5	2.7	996.2	504.7	52.3	1,334.9	754.3	2,646.2	3,642.4	Minnesota
—	—	226.2	78.2	2.0	69.9	307.1	457.2	683.4	Mississippi
—	—	419.0	391.2	8.7	312.8	363.8	1,076.5	1,495 5	Missouri
190.6	7.5	2,071.5	1,415.2	267.4	732.1	1,551.3	3,966.0	6,037.5	Montana
—	—	64.5	7.5	2.0	5.7	14.9	30.1	94.6	Nebraska
88.0	—	483.9	312.9	28.7	74.3	322.6	738.5	1,222.4	Nevada
245.1	1.5	888.3	415.8	306.3	42.6	286.3	1,051.0	1,939.3	New Hampshire
223.3	5.0	1,216.1	638.8	80.4	255.3	1,196.6	2,171.1	3,387.2	New Mexico
—	—	28.0	3.4	5.0	2.0	13.7	24.1	52.1	New York
—	2.9	647.0	650.9	88.8	288.3	463.4	1,491.4	2,138.4	North Carolina
—	—	3.2	8.8	—	6.2	30.5	45.5	48.7	North Dakota
—	—	118.3	189.7	4.1	21.7	43.6	259.1	377.4	Ohio
—	—	125.1	118.2	—	68.5	72.1	258.8	383.9	Oklahoma
291.8	2.8	7,196.4	3,962.4	556.9	2,318.9	3,294.1	10,132.3	17,328.7	Oregon
—	—	605.1	539.4	4.8	219.7	437.5	1,201.4	1,806.5	Pennsylvania
—	.1	158.8	63.0	1.9	.5	2.7	68.1	226.9	Puerto Rico
—	—	94.1	156.2	4.9	89.7	311.6	562.4	656.5	South Carolina
15.1	2.4	648.4	907.5	9.4	133.2	269.3	1,319.4	1,967.8	South Dakota
—	—	608.7	314.0	30.8	199.7	309.7	854.2	1,462.9	Tennessee
—	—	417.1	183.8	1.5	448.3	175.7	809.3	1,226.4	Texas
209.7	16.4	2,863.2	1,518.5	306.3	1,033.0	1,668.0	4,525.8	7,389.0	Utah
437.0	—	510.2	511.1	15.2	11.0	65.6	602.9	1,113.1	Vermont
—	3.3	550.1	885.4	136.8	239.7	845.5	2,107.4	2,657.5	Virginia
781.2	—	4,205.1	2,787.2	695.5	890.6	2,531.7	6,905.0	11,110.1	Washington
—	3.3	448.5	203.5	31.5	160.7	328 6	724.3	1,172.8	West Virginia
11.4	—	503.8	462.2	13.0	330.3	441.5	1,247.0	1,750.8	Wisconsin
123.1	.2	1,672.4	829.0	146.6	431.3	940.3	2,347.2	4,019.6	Wyoming
5,661.8	140.1	63,740.3	38,738.4	5,573.0	20,277.8	34,508.6	99,097.8	162,838.1	Nationwide
8.89	0.22	100.00							Percent use of developed sites only
			39.09	5.62	20.46	34.82	99.99		Percent use of dispersed areas only
3.48	0.08	39.14	23.79	3.42	12.45	21.19	60.85	99.99	Percent use of developed sites and dispersed areas

for 12 hours, 12 persons for 1 hour, or any equivalent combination of individual or group use, either continuous or

TABLE 7.—*Recreation activities of visitors to National Forests, National*

(NUMBER OF VISITOR-DAYS

State and Commonwealth	Camping	Picnicking	Recreation travel (mechanized)			Boating	Games and team sports	Water-skiing and other water sports	Swimming and scuba diving	Winter sports
			Auto	Motorcycle, Scooter, etc.	Ice and snow craft					
Alabama	146.1	97.6	147.8	8.4	—	23.2	0.3	7.0	55.6	—
Alaska	201.0	68.1	238.6	14.2	13.5	293.1	2.7	1.8	14.2	43.2
Arizona	1,827.6	430.6	1,639.5	48.9	4.0	146.3	46.3	62.3	156.7	50.1
Arkansas	357.7	121.3	487.5	7.5	—	92.3	6.6	13.0	160.9	0.1
California	13,390.1	1,118.9	9,702.7	646.0	95.8	801.5	257.6	147.1	928.3	1,653.2
Colorado	2,578.7	456.3	2,739.0	115.1	164.1	125.9	8.9	11.3	10.7	1,187.8
Florida	897.3	83.2	184.8	4.3	—	116.8	3.6	26.9	165.3	—
Georgia	390.1	32.1	319.3	12.6	—	25.0	1.5	5.1	30.5	—
Idaho	2,230.8	354.3	1,529.8	177.3	160.7	193.7	19.6	29.6	102.8	293.3
Illinois	121.2	56.5	278.2	15.0	—	9.2	0.3	—	33.0	—
Indiana	125.7	60.1	155.2	18.9	—	67.8	—	24.1	13.8	—
Kansas	0.9	8.2	13.6	—	—	—	—	—	—	—
Kentucky	129.0	76.1	238.3	7.0	—	99.5	2.5	12.8	10.7	—
Louisiana	158.5	43.6	45.4	1.6	—	15.7	—	7.9	90.7	—
Maine	13.5	3.2	6.1	0.2	1.0	0.2	0.1	—	0.3	—
Michigan	848.1	120.3	1 259.9	44.4	192.9	125.4	11.4	5.4	91.4	152.2
Minnesota	915.0	40.9	418.8	15.1	156.1	480.5	8.6	27.1	77.0	18.8
Mississippi	155.5	54.1	68.8	3.0	—	25.3	1.7	2.0	25.1	—
Missouri	312.5	95.1	328.4	16.1	—	153.8	1.1	5.4	57.0	—
Montana	1,230.4	307.5	1,239.8	66.9	257.0	121.9	13.6	18.5	50.7	195.0
Nebraska	15.8	9.8	5.3	0.7	—	0.9	1.5	0.4	1.8	0.1
Nevada	267.5	97.3	297.0	13.9	9.3	0.3	13.3	0.1	10.7	91.4
New Hampshire	548.5	38.5	404.6	6.3	25.4	0.2	3.0	0.1	18.0	218.8
New Mexico	831.2	378.5	585.9	54.1	8.0	11.3	21.1	—	21.4	173.9
New York	7.5	2.0	3.4	—	2.7	—	—	—	—	—
North Carolina	381.9	126.1	591.0	49.9	—	79.4	6.7	6.6	42.7	—
North Dakota	5.9	3.3	6.3	0.8	0.7	0.8	—	—	0.3	1.6
Ohio	57.7	30.6	152.8	22.0	—	7.1	—	—	27.8	0.7
Oklahoma	49.6	44.3	85.3	2.6	—	8.7	—	0.8	23.4	—
Oregon	4,549.4	723.1	3,544.4	175.4	104.7	487.6	29.0	98.1	294.1	342.5
Pennsylvania	384.7	75.1	276.8	6.2	16.9	92.4	5.1	11.8	36.2	3.9
Puerto Rico	0.2	64.8	62.7	0.1	—	—	—	—	5.5	—
South Carolina	67.5	37.1	140.8	1.0	—	32.1	0.6	9.3	8.1	0.2
South Dakota	362.6	132.4	842.9	28.4	18.1	27.4	4.1	1.9	16.4	22.2
Tennessee	327.5	78.1	279.9	17.4	—	52.4	7.4	19.3	57.9	—
Texas	398.2	38.5	177.9	3.8	—	58.9	0.3	8.9	27.2	—
Utah	2,095.9	496.7	1,343.6	73.2	96.9	176.2	48.2	9.9	44.4	238.3
Vermont	53.6	13.3	324.6	4.0	7.6	0.3	0.1	—	6.0	425.7
Virginia	457.2	116.9	745.6	44.1	—	13.3	10.5	—	50.4	0.7
Washington	2,847.0	470.4	2,122.7	210.5	91.0	165.8	17.6	17.2	76.5	668.3
West Virginia	356.4	50.3	87.3	15.0	—	4.0	4.5	—	27.0	—
Wisconsin	458.9	30.3	392.5	8.6	54.9	82.7	0.1	7.5	45.2	11.0
Wyoming	1,075.3	152.3	781.4	20.0	74.0	48.4	26.0	4.7	17.1	105.6
Nationwide	41,629.7	6,837.7	34,296.2	[2]1,980.5	1,555.3	4,267.3	585.5	603.9	2,932.8	5,898.6
Percent of total use	25.6	4.2	21.1	1.2	0.9	2.6	0.4	0.4	1.8	3.6

[1] Recreation use of National Forest System land and water which aggregates 12 person-hours. May entail 1 person 12 hours, 12 persons for 1 hour, or any equivalent combination of individual or group use, either continuous or intermittent.

[2] Also includes bicycling (94.5), aerial tramways (53.4), and aircraft (91.2).

Grasslands, and other lands administered by the Forest Service, calendar year 1969

OF RECREATION USE,[1] IN THOUSANDS)

Fishing	Hunting	Hiking and mountain climbing	Horseback riding	Resort use	Organization camp use	Recreation residence use	Gathering forest products	Nature study	Viewing scenes, sports, Environment	Visitor information (exhibits, talks, etc.)	Total recreation use
63.3	129.0	28.5	10.8	—	—	—	17.4	4.0	2.7	17.5	759.2
167.4	166.0	78.5	0.8	18.7	17.7	38.5	5.7	4.2	34.4	32.2	1,454.5
474.3	371.8	240.8	116.1	309.5	228.4	265.1	81.0	43.3	137.4	91.1	6.771.1
269.6	258.6	36.2	21.1	28.8	36.0	15.8	11.0	5.1	51.9	38.0	2,019.0
3,377.2	1,815.6	1,342.3	367.9	1,456.3	2,114.4	4,501.5	154.9	274.7	1,062.8	432.7	45,641.5
1,080.4	749.8	263.3	240.0	143.0	140.3	236.5	68.8	38.4	301.0	119.8	10,779.1
253.5	456.2	16.9	12.8	--	54.5	132.0	5.1	11.7	49.3	21.5	2,495.7
132.1	282.7	64.6	13.5	12.1	29.2	24.1	4.0	5.0	72.9	11.8	1,468.2
1,175.4	1,240.0	236.6	193.7	168.1	149.5	275.6	82.5	43.1	150.3	110.1	8,916.8
21.0	112.9	16.9	35.5	—	—	—	1.5	1.8	60.3	7.0	770.3
99.8	43.5	11.7	18.2	—	—	—	14.9	2.6	0.8	6.0	663.1
0.4	8.4	—	—	—	—	—	—	0.2	0.1	0.4	32.2
80.8	122.6	64.5	17.4	—	3.8	8.1	12.7	1.9	27.0	18.1	932.8
20.2	110.2	4.2	2.8	—	19.8	25.5	2.9	1.9	2.1	4.9	557.9
2.4	5.0	3.5	0.2	—	0.8	—	0.1	1.7	1.6	0.3	40.2
338.3	594.7	30.4	15.8	4.1	41.0	63.9	64.7	14.7	79.1	47.0	4,145.1
744.3	274.1	23.9	8.4	95.6	35.2	153.8	26.1	23.1	76.7	23.3	3,642.4
37.5	228.2	11.3	5.2	—	52.1	—	4.4	2.3	3.3	3.6	683.4
126.5	250.1	37.3	23.7	—	6.1	—	8.3	5.2	21.9	47.0	1,495.5
608.7	707.4	163.9	149.1	94.2	76.0	374.9	61.7	20.6	176.3	103.4	6,037.5
4.5	8.2	2.3	1.6	—	17.4	—	2.5	0.6	1.9	19.3	94.6
72.9	108.8	25.7	22.9	—	71.8	25.4	35.8	13.3	31.6	13.4	1,222.4
34.5	21.3	305.0	0.2	66.8	4.5	—	1.0	2.6	229.8	10.2	1,939.3
227.5	347.7	158.7	73.1	8.6	53.7	78.1	119.8	32.8	138.8	63.0	3,387.2
1.5	9.5	1.9	1.0	—	21.0	—	0.5	1.1	—	—	52.1
180.6	314.9	113.2	18.9	12.0	3.0	9.8	9.0	7.8	168.6	16.3	2,138.4
3.5	17.9	2.0	1.9	—	—	—	2.7	0.3	—	0.7	48.7
11.1	32.3	8.8	12.1	—	—	—	7.3	3.1	2.8	1.2	377.4
48.3	51.8	9.5	3.0	—	—	—	3.0	2.4	14.6	36.6	383.9
1,844.8	1,408.3	454.5	206.1	774.6	280.8	829.9	108.5	110.3	783.3	179.3	17,328.7
107.9	290.0	21.9	16.3	—	46.2	90.5	11.9	12.3	255.9	44.5	1,806.5
—	—	2.1	—	9.4	51.0	1.6	0.2	0.1	26.0	3.2	226.9
46.6	250.0	10.5	9.9	—	—	—	25.1	4.9	12.1	0.7	656.5
106.9	153.4	23.6	25.7	7.0	37.8	55.1	13.4	32.4	43.3	12.8	1,967.8
129.2	187.4	42.9	17.7	43.3	56.7	74.2	7.1	4.4	36.2	23.9	1,462.9
367.8	112.4	6.6	3.3	7.5	1.0	—	5.1	4.2	2.6	2.2	1,226.4
838.1	587.4	281.7	157.0	218.4	125.0	207.6	33.6	44.1	175.2	97.6	7,389.0
9.5	52.1	16.3	0.9	1.3	—	—	1.1	0.2	193.6	2.9	1,113.1
220.4	575.5	149.3	37.0	0.1	37.9	1.1	10.4	10.1	140.0	37.0	2,657.5
748.7	769.1	516.0	193.0	299.6	302.5	353.6	384.5	58.6	688.6	108.9	11,110.1
158.4	240.8	26.8	2.4	—	36.8	0.6	3.3	5.9	139.8	13.5	1,172.8
230.2	324.5	12.9	4.5	2.1	10.5	10.3	13.2	2.5	32.8	15.6	1,750.8
402.2	357.8	94.9	109.0	252.1	161.6	162.1	14.2	18.5	113.3	29.1	4,019.6
14,868.2	14,147.9	4,962.4	2,170.5	4,033.2	4,324.0	8,015.2	1,440.9	878.0	5,542.7	1,867.6	162,838.1
9.1	8.7	3.0	1.3	2.5	2.7	4.9	0.9	0.5	3.4	1.1	99.9

TABLE 8.—*Fires controlled by Forest Service organizations to protect National Forest lands, and area burned, calendar year 1969*

State	Number of fires						Area burned (acres)	
	Lightning	Smoking	Recreation	Incendiary	Other	Total	NF	Other
Alabama	9	35	17	20	33	114	936	739
Alaska	0	1	11	0	6	18	270	1
Arizona	783	107	102	4	78	1,074	21,315	1,062
Arkansas	16	30	38	94	40	218	1,193	557
California	1,251	270	216	120	445	2,302	18,040	1,647
Colorado	127	17	38	1	25	208	789	308
Florida	51	14	4	38	55	162	513	104
Georgia	1	11	16	19	19	66	326	344
Idaho	365	60	83	5	65	578	1,885	121
Illinois	0	11	3	3	29	46	120	455
Indiana	0	4	1	15	2	22	133	136
Kansas	0	0	0	0	0	0	0	0
Kentucky	0	18	15	29	32	94	388	646
Louisiana	8	19	32	96	73	228	2,108	425
Maine	0	0	0	0	0	0	0	0
Michigan	3	27	22	8	69	129	116	471
Minnesota	11	4	15	5	12	47	94	70
Mississippi	2	41	47	146	86	322	2,177	660
Missouri	3	38	33	117	107	298	2,427	1,571
Montana	297	46	57	16	158	574	1,603	227
Nebraska	13	0	0	0	6	19	621	447
Nevada	48	5	6	0	1	60	161	22
New Hampshire	0	2	2	2	3	9	15	0
New Mexico	564	14	28	8	17	631	2,677	878
New York	0	0	0	0	0	0	0	0
North Carolina	2	16	10	31	81	140	774	972
North Dakota	3	1	0	0	3	7	164	0
Ohio	0	19	8	31	41	99	146	529
Oklahoma	2	4	2	43	14	65	717	229
Oregon	723	116	220	5	154	1,218	9,395	1,211
Pennsylvania	0	4	1	1	2	8	34	46
South Carolina	2	17	5	21	33	78	380	205
South Dakota	78	0	11	5	22	116	668	736
Tennessee	3	6	9	63	13	94	553	250
Texas	6	34	29	13	46	128	730	344
Utah	131	8	29	0	19	187	104	118
Vermont	1	0	1	0	0	2	0	0
Virginia	9	7	9	8	17	50	522	105
Washington	91	70	111	3	112	387	531	632
West Virginia	3	8	4	4	8	27	179	196
Wisconsin	2	5	2	2	8	19	113	48
Wyoming	118	8	43	2	19	190	2,062	535
Nationwide	4,726	1,097	1,280	978	1,953	10,034	74,979	17,047

TABLE 9.—*Forest fires on protected State and private lands, and area burned, calendar year 1969; and expenditures for fire control, fiscal year 1969*

State	Area protected	Fires	Area burned	Prevention and suppression expenditures			
				Federal	State and county	Private [1]	Total
	Thousand acres	*Number*	*Acres*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
Alabama	20,943	9,477	166,530	424,493	1,642,364	160,587	2,227,444
Alaska	16,000	260	195,833	143,771	159,569	—	303,340
Arizona	1,341	40	295	34,734	26,678	8,159	69,571
Arkansas	16,535	4,183	108,192	420,358	1,235,958	96,325	1,752,641
California	19,985	3,160	49,119	1,006,050	25,541,443	—	26,547,493
Colorado	9,482	499	8,534	118,187	438,652	—	556,839
Connecticut	1,990	399	1,462	108,994	345,212	—	454,206
Delaware	392	20	175	15,039	20,021	—	35,060
Florida	17,644	4,898	63,839	562,578	5,604,393	—	6,166,971
Georgia	24,066	8,743	47,098	595,307	5,224,229	—	5,819,536
Hawaii	1,929	35	45,850	50,887	71,120	—	122,007
Idaho	9,901	502	17,047	229,030	713,363	149,578	1,091,971
Illinois	3,568	243	4,772	96,019	282,719	—	378,738
Indiana	4,012	685	14,536	77,370	207,116	—	284,486
Iowa	2,609	133	2,157	55,082	96,804	—	151,886
Kansas	12,552	566	8,649	155,874	540,006	—	695,880
Kentucky	10,953	3,079	54,000	293,656	1,173,679	—	1,467,335
Louisiana	12,239	8,929	107,457	471,161	2,893,431	21,843	3,386,435
Maine	17,321	300	2,398	395,270	1,524,909	—	1,920,179
Maryland	2,855	543	1,941	167,373	788,424	—	955,797
Massachusetts	3,252	6,653	8,371	195,065	512,247	—	707,312
Michigan	17,641	1,016	6,544	496,997	2,306,634	—	2,803,631
Minnesota	17,653	608	24,575	317,598	767,001	—	1,084,599
Mississippi	15,661	7,962	106,614	480,499	2,135,951	—	2,616,450
Missouri	11,140	3,243	61,162	359,277	1,681,596	—	2,040,873
Montana	6,747	399	1,716	156,261	252,512	330,203	738,976
Nebraska	7,022	240	42,582	122,656	329,844	—	452,500
Nevada	2.216	154	1,482	127,785	488,109	—	615,894
New Hampshire	4,339	473	255	105,924	303,370	6,951	416,245
New Jersey	2,108	1,237	3,528	181,858	833,144	—	1,015,002
New Mexico	37,584	111	34,746	74,880	72,822	18,970	166,672
New York	12,621	894	5,135	382,496	1,988,064	—	2,370,560
North Carolina	17,819	4,177	67,254	502,216	2,825,786	36,979	3,364,981
North Dakota	228	6	40	13,387	13,388	—	26,775
Ohio	4,005	2,015	13,353	140,153	728,124	—	868,277
Oklahoma	4,325	1,062	76,348	174,928	307,284	19,269	501,481
Oregon	13,099	964	2,762	512,685	3,782,956	334,214	4,629,855
Pennsylvania	16,560	1,735	16,508	363,676	1,948,529	—	2,312,205
Rhode Island	434	311	1,069	51,910	237,526	—	289,436
South Carolina	12,050	3,840	34,628	420,847	2,208,691	—	2,629,538
South Dakota	3,960	220	3,254	51,043	166,273	—	217,316
Tennessee	12,661	3,251	27,290	445,793	2,513,449	6,150	2,965,392
Texas	9,874	2,519	30,601	346,968	1,027,911	148,196	1,523,075
Utah	9,006	142	3,860	94,579	352,933	—	447,512
Vermont	4,084	81	168	61,494	108,515	—	170,009
Virginia	14,413	1,934	10,797	414,613	1,874,503	—	2,289,116
Washington	12,509	1,293	5,518	526,290	3,896,669	—	4,422,959
West Virginia	10,562	2,059	63,364	187,087	590,051	—	777,138
Wisconsin	15,264	1,704	3,000	434,179	2,314,518	—	2,748,697
Wyoming	6,811	396	25,981	68,159	123,499	—	191,658
Federal administration, inspection, prevention, and special services to the States	—	—	—	1,163,464	—	—	1,163,464
Nationwide	511,965	97,393	1,582,389	14,396,000	85,221,989	1,337,424	100,955,413

[1] Private expenditures made under direct supervision of State foresters as part of the Clarke-McNary program.

TABLE 10.—*Distribution of forest and windbarrier planting stock by cooperating States, fiscal year 1969 (under Clarke-McNary program)*

State and Commonwealth	Expenditures derived from—			Trees distributed
	Federal allotment	State appropriation	Receipts	
	Dollars	*Dollars*	*Dollars*	*Number*
Alabama	2,500	63,424	265,311	55,049,000
Arkansas	2,500	57,037	66,687	9,167,000
California	3,500	72,417	66,539	2,975,000
Colorado	2,207	2,207	51,592	386,000
Connecticut	2,000	33,554	27,773	1,006,000
Delaware	2,000	32,132	—[1]	1,146,000
Florida	—[1]	262,542	228,803	54,236,000[2]
Georgia	2,500	104,440	207,850	41,472,000
Hawaii	3,000	147,674	2,025	890,000
Idaho	12,000	14,152	17,503	838,000
Illinois	2,500	188,076	95,273	4,024,000
Indiana	2,500	114,444	102,575	5,333,000
Iowa	—[1]	—[1]	—[1]	809,000[2]
Kansas	12,000	19,770	52,050	587,000
Kentucky	4,000	175,247	43,514	5,797,000
Louisiana	2,500	57,447	148,607	31,290,000
Maine	2,000	80,622	49,056	2,198,000
Maryland	2,000	59,595	16,223	6,375,000
Massachusetts	440	17,362	3,281	262,000
Michigan	2,500	157,047	108,000	4,680,000
Minnesota	2,500	353,878	138,055	15,645,000
Mississippi	2,500	198,306	166,086	28,330,000
Missouri	2,500	169,620	84,327	5,277,000
Montana	12,000	20,929	35,799	1,097,000
Nebraska	6,000	24,377	148,919	1,805,000
Nevada	12,000	20,958	11,044	92,000
New Hampshire	2,000	40,847	19,593	1,132,000
New Jersey	2,000	20,245	12,096	758,000
New Mexico	12,000	13,087	6,103	148,000
New York	5,560	282,393	153,672	18,223,000
North Carolina	2,500	55,223	305,435	49,347,000
North Dakota	12,000	12,000	41,343	1,066,000
Ohio	2,500	308,971	118,453	11,393,000
Oklahoma	9,000	37,104	7,886	741,000
Oregon	2,500	43,721	228,475	16,395,000
Pennsylvania	2,000	324,679	74,578	12,439,000
Puerto Rico	3,000	83,292	—[3]	547,000
Rhode Island	2,000	10,744	3,802	187,000
South Carolina	2,500	148,448	119,911	26,299,000
South Dakota	12,000	26,243	55,067	1,329,000
Tennessee	2,500	86,775	48,635	9,931,000
Texas	2,500	2,770	82,612	11,019,000
Utah	10,718	10,718	8,495	140,000
Vermont	2,000	44,615	15,750	816,000
Virginia	3,500	183,144	164,670	41,124,000
Washington	—[1]	338,493	376,860	14,100,000[2]
West Virginia	2,500	273,484	141,010	8,743,000
Wisconsin	2,000	612,439	357,383	17,166,000
Wyoming	3,201	3,201	11,312	177,000
Virgin Islands	3,000	10,875	—[3]	—[3]
Nationwide	203,626	5,420,768	4,490,033	523,986,000

[1] No. C–M–4 money

[2] This production reflects no C–M–4 funding

[3] Trees distributed free

TABLE 11.—*Planting stock available for forest and windbarrier planting, fiscal year 1969; area planted or seeded on Federal, State, and private lands, fiscal year 1969; and total acreage planted since 1926*

State and Commonwealth	Planting stock shipped, fiscal year 1969				Area planted or seeded fiscal year 1969	Grand total, forest and windbarrier plantings since 1926
	Federal nurseries	State nurseries	Other	Total		
	Thousands	*Thousands*	*Thousands*	*Thousands*	*Acres*	*Acres*
Alabama	—	58,175	14,177	72,439	136,693	1,843,283
Alaska	0	0	0	0	15	5,117
Arizona	0	0	0	0	707	24,463
Arkansas	0	9,377	0	9,377	18,527	583,586
California	18,131	3,167	325	21,623	48,661	502,527
Colorado	3,378	1,246	0	4,624	6,975	179,242
Connecticut	0	1,412	0	1,412	1,745	61,574
Delaware	0	965	0	965	1,050	14,402
Florida	0	58,973	27,144	86,117	161,845	2,859,610
Georgia	0	55,969	22,356	78,325	106,119	2,815,486
Hawaii	0	893	0	893	1,953	126,536
Idaho	19,299	869	0	20,168	35,373	322,883
Illinois	0	6,707	0	6,707	5,734	221,720
Indiana	0	6,396	0	6,396	12,626	220,239
Iowa	0	788	0	788	1,825	97,359
Kansas	0	0	25	25	1,894	263,305
Kentucky	0	6,095	2,202	8,297	17,446	272,573
Louisiana	0	32,914	5,331	38,245	60,962	1,798,059
Maine	0	2,625	0	2,625	2,577	66,934
Maryland	0	6,375	330	6,705	7,442	121,565
Massachusetts	0	142	360	502	1,018	111,972
Michigan	9,768	4,681	11,780	26,229	25,878	1,684,375
Minnesota	6,123	15,645	0	21,768	33,201	844,149
Mississippi	15,906	30,196	0	46,102	77,467	1,912,620
Missouri	0	7,178	0	7,178	10,673	239,534
Montana	783	1,099	260	2,142	23,291	208,920
Nebraska	4,741	0	0	4,741	4,939	432,399
Nevada	0	74	0	74	200	6,900
New Hampshire	0	1,212	0	1,212	1,064	60,628
New Jersey	0	628	0	628	1,771	59,883
New Mexico	0	0	0	0	4,325	45,200
New York	0	18,549	0	18,549	18,517	1,326,356
North Carolina	0	54,823	1,705	56,528	79,175	1,008,716
North Dakota	0	1,559	3,981	5,540	3,183	232,194
Ohio	0	14,459	0	14,459	18,477	431,341
Oklahoma	0	902	0	902	1,075	155,462
Oregon	4,606	20,598	8,587	33,791	148,720	2,032,611
Pennsylvania	0	13,196	4,055	17,251	5,150	1,095,077
Puerto Rico	0	547	0	547	546	106,092
Rhode Island	0	0	0	0	258	37,450
South Carolina	0	29,529	12,352	41,881	37,726	1,557,866
South Dakota	0	1,584	0	1,584	8,058	272,405
Tennessee	0	12,434	5,140	17,574	17,159	796,267
Texas	0	11,763	0	11,763	41,644	769,759
Utah	0	140	150	290	2,035	26,230
Vermont	0	816	0	816	898	82,055
Virgin Islands	0	0	0	16	21	21
Virginia	0	40,703	9,000	49,703	70,379	794,334
Washington	13,965	17,655	6,096	37,716	101,965	1,191,663
West Virginia	0	9,525	0	9,525	18,967	171,945
Wisconsin	0	17,312	1,850	19,162	26,709	1,195,751
Wyoming	0	16	0	16	21	42,379
Nationwide	96,700	579,908	137,206	813,814	1,457,470	31,333,017

TABLE 12.—*Cooperative Forest Management progress and expenditures, fiscal year 1969*

[FOREST SERVICE AND STATE FORESTERS COOPERATING]

State and Commonwealth	Progress				Expenditures		
	Woodland owners assisted	Woodland involved	Products harvested	Gross sale value	Federal	State	Total
	Number	*Acres*	*M Bd. Ft.*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
Alabama	957	83,264	19,879	869,509	49,200	69,122	118,322
Alaska	5	0	0	0	12,533	12,533	25,066
Arkansas	618	62,108	1,145	23,637	54,100	54,897	108,997
California	2,173	337,687	46,981	3,245,055	52,400	116,628	169,028
Colorado	1,161	149,340	949	22,170	35,900	107,144	143,044
Connecticut	1,389	58,949	1,991	326,483	31,561	53,760	85,321
Delaware	50	1,710	0	0	4,700	4,700	9,400
Florida	2,919	592,228	35,620	1,433,172	133,000	330,605	468,605
Georgia	7,437	662,065	32,157	4,298,289	124,100	260,631	384,731
Hawaii	321	13,008	1,602	99,157	14,512	14,511	29,023
Idaho	984	35,347	2,572	249,690	30,500	41,782	72,282
Illinois	1,898	51,867	3,505	286,707	68,300	128,900	197,200
Indiana	1,996	87,446	6,849	414,129	53,012	97,297	150,309
Iowa	1,768	20,058	1,975	201,796	39,900	72,100	112,000
Kansas	1,583	21,523	779	138,911	22,500	54,058	76,558
Kentucky	2,988	115,116	10,424	425,697	124,900	356,000	480,900
Louisiana	1,174	89,756	13,512	253,355	51,600	93,040	144,640
Maine	2,083	73,873	22,705	337,455	74,348	159,290	233,638
Maryland	1,678	23,974	5,942	179,305	58,778	169,508	228,286
Massachusetts	2,441	48,482	11,543	257,632	34,700	60,377	95,077
Michigan	1,935	65,688	8,718	377,454	98,500	170,348	268,848
Minnesota	3,902	86,574	1,595	66,635	68,000	159,769	227,769
Mississippi	4,920	404,145	13,979	346,636	76,000	129,134	205,134
Missouri	4,391	221,141	21,501	547,500	114,142	302,885	417,027
Montana	304	16,016	636	19,433	32,200	33,316	65,516
Nebraska	1,106	7,593	1,722	84,688	32,700	72,698	105,398
Nevada	517	15,909	0	0	23,272	25,273	48,545
New Hampshire	2,670	104,039	10,651	256,190	42,300	61,770	104,070
New Jersey	1,113	37,262	1,965	70,334	36,700	69,145	105,845
New Mexico	314	239,567	13,043	103,578	30,400	56,123	86,523
New York	10,187	270,497	29,300	684,417	157,320	207,121	364,441
North Carolina	5,513	170,236	79,926	2,185,620	162,800	430,416	593,216
North Dakota	225	2,947	2,488	17,406	30,100	30,100	60,200
Ohio	2,638	92,588	12,931	664,016	86,556	236,875	323,431
Oklahoma	344	34,890	418	17,313	20,612	20,612	41,224
Oregon	2,130	165,326	19,780	1,844,844	32,700	63,726	96,426
Pennsylvania	3,209	110,630	15,207	337,474	115,500	250,000	365,500
Puerto Rico	1,717	1,374	42	1,005	30,300	41,077	71,377
Rhode Island	302	8,932	37	2,587	11,952	13,087	25,039
South Carolina	4,142	315,659	34,212	957,519	88,900	177,577	266,477
South Dakota	364	7,806	696	15,230	31,400	58,800	90,200
Tennessee	1,580	167,499	16,011	514,770	70,900	105,588	176,488
Texas	3,428	1,578,412	2,102	18,898	51,700	66,908	118,608
Utah	266	78,969	109	2,943	30,100	36,912	67,012
Vermont	3,512	82,612	14,294	439,772	68,651	209,110	277,761
Virginia	5,955	257,304	287,565	6,705,846	171,900	447,976	619,876
Virgin Islands	56	176	0	0	7,931	7,931	15,862
Washington	1,633	61,486	33,172	1,785,876	42,500	110,167	152,667
West Virginia	2,459	44,198	5,304	152,683	68,500	148,768	217,268
Wisconsin	6,712	158,779	23,815	591,562	204,300	335,137	539,437
Wyoming	19	3,815	877	8,770	20,894	20,894	41,788
Nationwide	113,186	7,339,870	872,226	31,883,148	3,130,274	6,356,126	9,486,400

TABLE 13.—*National Forest and cooperative pest control accomplishments, fiscal year 1969*

[OAK WILT CONTROL]

Ownership or management	Area surveyed	Trees treated
	Acres	*Number*
National Forest:		
Monongahela (W. Va.)	1,338,000	91
State and private:		
North Carolina	3,734,000	26
Pennsylvania	17,120,000	2,644
Virginia	926,000	94
West Virginia	20,430,000	3,319
Total	43,548,000	6,174

[INSECT CONTROL]

Ownership or management	Bark beetles	Defoliators	Other insects	
	Trees [1] treated	Area treated	Area treated	Trees treated
	Number	*Acres*	*Acres*	*Number*
National Forest	461,142	14,231	446	43,100
State and private	423,831	19,624	257	320,135
Nationwide	884,978	33,855	703	363,235

[1] Includes infested trees, stumps, and cull logs.

[WHITE PINE BLISTER RUST AND DWARF MISTLETOE CONTROL]

Ownership or management	Blister rust			Dwarf mistletoe	
	Surveyed	Treated	Ribes Eradicated	Surveyed	Treated
	Acres	*Acres*	*Number*	*Acres*	*Acres*
National Forest	98,944	12,233	545,473	211,759	23,566
State and private	1,505,876	47,248	1,213,578	200	467
Nationwide	1,604,820	59,481	1,759,051	211,959	24,033

TABLE 14.—*Forest Service receipts and expenditures, all programs and sources, fiscal year 1969*

Item	Receipts	Expenditures
	Dollars	*Dollars*
National Forest programs:		
Cash receipts and appropriate expenditures	372,498,484	357,943,845
Cash receipts from National Forest land collected in conjunction with and deposited to accounts of other agencies (Federal Power Commission, Department of the Interior)	28,754,180 [1]	
Noncash income and expense (roads built by timber purchasers)	93,770,445	93,770,445
Total	495,023,109	451,714,290
Forest research programs:		
Forest research appropriations		39,964,489
Cooperative research work	735,402	713,023
Total	735,402	40,677,512
State and private forestry programs:		
Fire protection, tree distribution, and forest management cooperation		19,854,871
Assistance to States for tree planting		997,214
Insect and disease control		2,314,253
Flood prevention and watershed protection		3,315,027
Forest fire prevention, "Smokey Bear"	100,461	90,232
Cooperative funds	1,291,025	1,189,922
Total	1,391,486	27,761,519
Work for other Government agencies and non-Government persons and firms:		
Economic Opportunity program		44,493,166
Land and Water Conservation program	—[1]	16,047,115
Insect and disease control (Interior Department lands)		47,980
Miscellaneous work for other Government agencies	6,110,997	8,043,130
Work performed for non-Government persons, firms, etc.—Cooperative work	1,055,598	1,007,435
Reimbursed	2,642,542	2,642,542
Total	9,809,137	72,281,368
Total Receipts and Expenditures	506,959,134	592,434,689
Internal equipment and supply service (working capital fund):		
Financed primarily by charges included above to Forest Service programs	25,996,197	27,890,749

[1] Receipts of $1,699,455 from the sale of Federal recreation area entrance permits, and $29,665 from the sale of surplus property were deposited to the credit of the Department of the Interior (BOR) during fiscal year 1969, and are not included in the receipts from National Forest land ($28,754,180) above.

NOTE—Expenditures are on an obligation basis, except Working Capital Fund, which is on an accrual basis.

TABLE 15.—*Portion of National Forest System receipts distributed to States or counties*

[RECEIPTS FROM NATIONAL FOREST LANDS]
(Fiscal year basis)

Item	Fiscal year 1968	Portion distributed (paid in fiscal year 1969)	Fiscal year 1969	Portion distributed (paid in fiscal year 1970)
	Dollars	*Dollars*	*Dollars*	*Dollars*
Receipts [1]	209,429,261		312,230,963	
Distributed by:				
Payments—25% Fund (Act of May 23, 1908, as amended)		52,325,638		77,838,380
Payments—Arizona-New Mexico School Fund, (Act of June 20, 1910)		90,193		124,709
Payments—Minnesota Superior National Forest, (Act of June 22, 1948)		146,232		257,955
Total	209,429,261	52,562,063	312,230,963	78,221,044

[1] Excludes approximately $5,219,645 due counties from fiscal year 1968 receipts on National Forest O&C lands. This amount was included in total receipts of $6,959,527 transferred to Interior. Also excludes approximately $5,201,822 due counties from fiscal year 1969 total receipts of $6,935,762. These amounts are distributed by the Department of Interior under the Act of Aug. 28, 1937, as amended.

[RECEIPTS FROM NATIONAL GRASSLANDS AND UTILIZATION AREAS]
(Calendar year basis)

Item	Calendar year 1968	Portion distributed	Calendar year 1969	Portion to be distributed
	Dollars	*Dollars*	*Dollars*	*Dollars*
Receipts	2,152,621		2,023,553	
Distributed by:				
Payments to Counties (Act of July 22, 1937)		538,155		505,888
Total	2,152,621	538,155	2,023,553	505,888

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